VOLUME VI.
1876–8.
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</table>
A cross of the sixteenth century type stands in a bottom between Pughtor and Sampford Tor, probably where the old road from Ashburton over Whitchurch Down divided to go to Horrabridge or Sampford Spiney. It stands about four feet high, and has the angles chamfered off.
On the road from Cornwood to Meavy, a short way from the Lee Moor Clay Works, where it forms a conspicuous object, is a cross on the side of the road. It has been down, and been replaced. It is about five feet six inches high, and stands on a square flat stone pedestal.

This cross has the angles carefully bevelled or chamfered off. One arm and the summit have been injured, or much weather-beaten.

This stone is known generally in the neighbourhood by the name of the Roman Cross.
ANNUAL REPORT

OF THE

PLYMOUTH INSTITUTION

AND

Devon and Cornwall Natural History Society.

1877-78.
OFFICERS OF THE INSTITUTION.

SESSION 1877-78.

President.

REV. F. E. ANTHONY, M.A.

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Members of Council.

DR. W. H. PEARSE.    MR. W. ADAMS.
# LIST OF MEMBERS.

## HONORARY MEMBERS.

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
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<tbody>
<tr>
<td>Beal, Rev. S., B.A., M.R.A.S., Falstone Rectory, Northumberland</td>
<td></td>
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<tr>
<td>Coleridge, Rev. Derwent</td>
<td></td>
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<td>Froude, W., M.A., C.E., F.R.S., M.I.C.E., Chelston Cross, Torquay</td>
<td></td>
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<tr>
<td>Gibbs, F. W., C.B., 24, Mount Street, Grosvenor Square, London</td>
<td></td>
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<tr>
<td>Lubbock, Sir John, Bart., F.R.S., F.L.S., High Elms, Kent</td>
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<td>Pengelly, W., F.R.S., F.G.S., Lamorna, Torquay</td>
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<tr>
<td>Scrivener, Rev. F. H. A., M.A., LL.D., Hendon, Middlesex</td>
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<tr>
<td>Temple, Right Rev. Dr., Bishop of Exeter, The Palace, Exeter</td>
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<tr>
<td>Vivian, Edward, M.A., Torquay</td>
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<tr>
<td>Worth, R. N., F.G.S., Patna Place, Plymouth</td>
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## LIFE MEMBERS.

<table>
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<tr>
<td>Alger, J., Australia</td>
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<tr>
<td>Alger, W. H., Ford Park, Plymouth</td>
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<tr>
<td>Bartlett, G., Plymouth</td>
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<td>White, James, London</td>
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## CORRESPONDING MEMBERS.

<table>
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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Barham, C., M.D., Truro</td>
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<tr>
<td>Blewett, Octavian, London</td>
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<tr>
<td>Boase, H. S., M.D., F.R.S., F.G.S., Dundee</td>
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<td>Harding, Col., F.G.S., Upcott, Barnstaple</td>
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<tr>
<td>Ormerod, G. W., M.A., F.G.S., Brookbank, Teignmouth</td>
<td></td>
</tr>
<tr>
<td>Peach, C. W., A.L.S., 30, Haddington Place, Edinburgh</td>
<td></td>
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<tr>
<td>Rodd, E. Hearle, Penzance</td>
<td></td>
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<tr>
<td>Towson, J. T., Liverpool</td>
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<tr>
<td>Vicary, W., F.G.S., Exeter</td>
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</tbody>
</table>
LECTURING MEMBERS.

Adams, W., jun., Sussex Terrace
Amery, Fabyan, Druid, Ashburton
Anthony, Rev. F. E., M.A., 13, Woodland Terrace

Bate, C. Spence, F.R.S., Mulgrave Place
Balkwill, Francis H., Lockyer Street
Bennett, E. G., Woodland Terrace
Bennett, J. N., Windsor Villas
Bere, Montague, Q.C., Grimstone, Horrabridge
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Briggs, Major J. A. J., Richmond Villa, Saltash Road

Cater, Samuel, North Devon Place
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Collier, W. F., Woodtown, Horrabridge
Collier, R., Eaton Place, London
Collier, Miss Bertha Cycill, Woodtown, Horrabridge
Collier, Charles Calmady, Woodtown, Horrabridge
Convey, Rev. T., M.A., 4, Wingfield Villas, Stoke
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Harvey, W., Mount Plymouth
Hine, James, F.R.I.B.A., Mulgrave Place

Hingston, C. Albert, M.D., B.Sc., 2, Sussex Terrace
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Inglis, James C., C.E., Radnor Place
Jackson, E. Steane, M.A., F.G.S., Portland Villas
Jackson, George, F.R.C.S., 1, St. George's Terrace
Jago, George, Cobourg Street
Keys, I. W. N., Bedford Street
Landon, Frederick George, M.A., St. Aubyn Street, Devonport
Latimer, Isaac, Frankfort Street
Lewis, J. D., 30, Eaton Square, London, S.W.
Lewis, Lewis, M.R.C.S., Westbury Terrace
Liscombe, Robert Lavers, Mount Athos, near Plymouth
MacCarthy, C. D., Bank of England
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Mitchell, P., Bedfor Terrace
Moore, W. F., The Friary
Morley, The Right Hon. the Earl of
Mount Edgecombe, The Right Hon. the Earl of

Neild, Frederick, M.D., 6, Sussex Terrace
Overy, Rev. H., B.A., St. Veep, Cornwall
Oxland, C., Portland Square
Oxland, R., Ph.D., F.C.S., Portland Square
Oxland, Rev. Harry, 3, Lipson Terrace
Pearse, W. H., M.D., 1, Alfred Place
Prowse, A. P., Mannamead
**LECTURING MEMBERS—continued.**

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Rider, A.</td>
<td>4, Haddington Road, Stoke</td>
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<tr>
<td>Risk, Rev. J.</td>
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<tr>
<td>Serpell, S. N.</td>
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<td>Sharman, Rev. W.</td>
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<td>Shelly, Arthur</td>
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<td>Slater, D.</td>
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<td>Braidwood Terrace</td>
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**ASSOCIATES.**

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Allport, S.</td>
<td>48, North Street</td>
</tr>
<tr>
<td>Andrews, T. N.</td>
<td>Charles School</td>
</tr>
<tr>
<td>Babb, H. R.</td>
<td>Richmond Walk, Devonport</td>
</tr>
<tr>
<td>Barrett, G. R.</td>
<td>Bank of England Place</td>
</tr>
<tr>
<td>Bayly, J.</td>
<td>Seven Trees</td>
</tr>
<tr>
<td>Bayly, Robert</td>
<td>Torr Grove, near Plymouth</td>
</tr>
<tr>
<td>Bayly, T. S.</td>
<td>Emma Place, Stonehouse</td>
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<tr>
<td>Bennett, W. m.a.</td>
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<tr>
<td>Beer, Joseph</td>
<td>The Terrace, H.M. Dockyard, Devonport</td>
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<tr>
<td>Bignell, George</td>
<td>S, Clarence Place, Stonehouse</td>
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<td>Brendon, W.</td>
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<td>Brendon, W.</td>
<td>Turner, George Street</td>
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<td>Bridson, H.</td>
<td>Warfleet, Dartmouth</td>
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<tr>
<td>Brown, Henry</td>
<td>North Hill House</td>
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<td>Brown, Geo. H.</td>
<td>Mill Lane</td>
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<td>Brown, Eldred</td>
<td>14, Lockyer Street</td>
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<tr>
<td>Cawse, Henry</td>
<td>Old Town Street</td>
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<tr>
<td>Clark, W.</td>
<td>Thorn Park Villas</td>
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<td>Cole, A.</td>
<td>Bedford Terrace</td>
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<td>Collins-Splatt</td>
<td>Hawtree, Windsor Ter.</td>
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<tr>
<td>Compton, C. E.</td>
<td>2, Mutley Park Ter.</td>
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<tr>
<td>Cox, Geo.</td>
<td>Manor Office, Stonehouse</td>
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<tr>
<td>Dawe, J. E. E.</td>
<td>8, Portland Villas</td>
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<tr>
<td>Deacon, Josiah</td>
<td>45, Durnford Street</td>
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<td>Derry, W.</td>
<td>Houndiscombe House</td>
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<td>Diment, Thomas</td>
<td>Laia House</td>
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<td>Dingle, R.</td>
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<td>Doe, Geo.</td>
<td>Great Torrington</td>
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<td>Edmonds, R. G.</td>
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<td>Eliott, S.</td>
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<td>Foster, J. B.</td>
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<td>Freeman, Ford F.</td>
<td>7, Southside Street</td>
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<td>Gibbons, Wm.</td>
<td>35, Tavistock Place</td>
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<td>Goulding, F. H.</td>
<td>George Street</td>
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<td>Grepe, J.</td>
<td>St. James’s Terrace</td>
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<td>Groser, Albert</td>
<td>North Devon Place</td>
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<td>Haldane, Alex.</td>
<td>10, Athenaeum Terrace</td>
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<td>Hall, Fred.</td>
<td>George Street</td>
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<tr>
<td>Harris, Henry</td>
<td>Vigurs, Union Street</td>
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<tr>
<td>Hawken, George</td>
<td>Three Towns Bank, Stonehouse</td>
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<td>Heath, W.</td>
<td>George Street</td>
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<td>Hicks, F.</td>
<td>Burrington</td>
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<td>Hoppen, Vosper</td>
<td>George Street</td>
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<td>Huobard, G.</td>
<td>Ford Park, Mutley</td>
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<tr>
<td>Inskip, Capt.</td>
<td>r.n., F.R.G.S., Houndiscombe Place</td>
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<td>Jago, C. S.</td>
<td>Cobourg Street</td>
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<td>James, W. C.</td>
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<td>James, Edward</td>
<td>Greenbank</td>
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<tr>
<td>James, Capt.</td>
<td>R. W. Yacht Club</td>
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<tr>
<td>Julian, Capt.</td>
<td>T. A., Woodside</td>
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<tr>
<td>Keen, Henry</td>
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<tr>
<td>Kendall, Miss A.</td>
<td>A. C., Plymouth High School</td>
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<tr>
<td>Kerwell, Alfred</td>
<td>J., Ham Street</td>
</tr>
</tbody>
</table>
ASSOCIATES—continued.

Kerswill, F. J., Frankfort Street
King, William, Hoe House
Langham, W. H., 4, Kirkby Place
Latimer, Alfred, Seaton Terrace
Luke, W. H., Bedford Street
Luscombe, H. A., 38, Clifton Place

Martin, W. L., Windsor Villas
Matcham, James, Mount Pleasant House, Millbay Road
Mitchell, T., Eton Villa
Monk, John E., 2, Princess Square
Morrish, F. A., 2, Bedford Terrace
Morris, Chas., 4, Edgcumbe Place, Stonehouse

Opie, E., 5, Braidwood Terrace
Page, J. A., 10, Windsor Terrace
Payne, James, 21, Clarendon Place, Citadel Road
Pearse, T. m.d., Flora Place
Pearse, S., Royal Hotel
Penson, James, Boon's Place
Pike, W. H., Clock Tower Chambers, George Street
Pitts, T., jun., Southside Street
Polkinghorne, E., Eliot Terrace
Radford, George, Bedford Street
Randle, J., Union Street
R ew, G. Gale, Lockyer Street
Rice, J., Millbay Soap Works.
Roberts, Erasmus, Carbeal, Torpoint
Rodda, R., Durnford Street, Stonehouse

Korie, John, m.d., R. M. Infirmary, Longroom, Stonehouse
Rough, Capt. David, 3, St. George's Terrace, Stonehouse
Rundle, R., Valletort Villa, Ford Park

Skelton, J., L.R.C.P., Grenville House, 6, Albany Place
Snell, H. J., Courtenay Street
Soitau, G. W., Little Efford
Spooner, E., 23, Portland Square
Square, William J., F.R.C.S., Portland Square
Stephenson, G., Old Town Street
Stephens, John, Caer Badden Terrace

Tanner, C. F., Mutley House
Tanner, W. E., 8, West Hoe Terrace
Taylor, J., jun., Flora Street
Thomas, Jenkin, Cornwall Street
Thorold, E., m.d., Windsor Villas
Tucker, W. F., 19, Torrington Place

Walsh, Sylvester, 21, Caprera Terrace
Williams, H. J., St. James's Place
Willoughby, J.es., 33, Wyndham Place
Wilson, J. W., 17, Woodland Terrace
Windeatt, John, Woodland House
Wolferstan, Sedley, M.R.C.S., Braidwood Terrace
Wonnacott, John, F.G.s., F.R.C.P., Wadham House, Liskeard
Woodhouse, Henri B. S., 41, Tavistock Place

LADY ASSOCIATES.

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Dawe, Miss, 8, Portland Villas
Issanchou, Mdlle., 1, Leigham Terrace
Loye, Mrs., 7, Osborne Place
Pomeroy, Miss S., Torrington House
Pomeroy, Mrs. 1, Edgcumbe Street, Stonehouse

Pomeroy, Miss, 1, Edgcumbe Street, Stonehouse
Pomeroy, Miss Marian, 1, Edgcumbe Street, Stonehouse

Rumble, Miss, Courtenay Street

Snell, Miss, Chapel Street, Stonehouse
Snell, Miss J., Chapel Street, Stonehouse

JUNIOR ASSOCIATES.

Burton, William Spelman, 18, Gascoigne Terrace
Pomeroy, Master, 1, Edgcumbe Street, Stonehouse
Varnier, Alex., The Crescent
The Secretaries present to the Society the following Report of the proceedings of the Session.

The Papers read and discussed were—

1877.
Oct. 4. Inaugural Address .... The President.
,, 11. Conversazione .... Mr. R. N. Worth, F.G.S.
,, 18. The Paleontology of Plymouth Mr. T. R. A. Briggs, F.L.S.
,, 25. Some Remarks on the Hedge-rows of the Neighbourhood Mr. W. Square, F.R.C.S., F.R.G.S.
Nov. 1. The Human Ear .... Rev. C. Chapman, M.A.
,, 8. Our Obligations to Greek Thought Mr. J. B. Rowe, F.S.A., F.L.S.
,, 15. Plympton Castle .... Mr. J. C. Inglis, C.B.
,, 22. Plymouth Sound: Its Tidal Currents Mr. R. N. Worth, F.G.S.
,, 29. The Early Commerce of Plympton. Part I. Dr. R. Oxland, F.C.S.
Dec. 6. On Tin .... Dr. W. H. Pearse.
,, 12. The Civilization of India .... Mr. T. A. Cragoe, F.R.G.S.
,, 20. English Literature 1878.
Jan. 10. Conversazione .... Sir George Young, Bart.
,, 17. The Friendly Societies of Devon and Cornwall. Rev. J. Erskine Risk, M.A.
,, 24. The Laws of National Progress Mr. E. Windeatt.
,, 21. The Early Commerce of Plymouth. Part II. Mr. R. N. Worth, F.G.S.
,, 28. The Ultimate Limit of Food Supply Mr. R. Smith.
Feb. 7. Modern Houses .... Mr. W. Harvey.
,, 21. The Ultimate Limit of Food Supply Dr. R. Oxland, F.C.S.
,, 28. The Trade of Plymouth .... Mr. W. Collier.
Although, owing to unavoidable circumstances, some alterations as regards sequence had to be made, yet the whole of the lectures announced on the cards, with one exception, were delivered.

The average attendance at the lectures has been sixty-four. Seven members, eleven associates, two lady associates, and two junior associates have joined the Society during the year, the present numbers being eighty members, one hundred and five associates, eleven lady associates, and three junior associates.

Many of the papers read during the Session were of a high order, had been prepared with great pains by the lecturers, and were most ably discussed. The volume of "Transactions" now in course of preparation under the continued editorship of Mr. C. Spence Bate F.R.S., will be among the best ever issued by the Society, both as regards the number and the quality of the papers recorded therein.

The annual excursion of the Society, which was intended to be held at Launceston on the 20th June, 1877, did not take place.

At the Anniversary meeting, held on the 1st May, the following short papers were read and discussed:

"The Handbooks of the Three Towns."
By Mr. J. Brooking Rowe, F.S.A., F.L.S.

"Notes on the Ancient Heraldry of Plymouth."
By Mr. R. N. Worth, F.G.S.

"Notes on Old Plymouth."
By Mr. J. Hine, F.R.I.B.A.

"Some Aspects of East Indian Civilization."
By Dr. W. H. Pearse.

The three first, being of much local interest, were ordered to be printed in the "Transactions."

The Council being desirous that the Society should be identified with the British Association, which met at Plymouth in August last, conferred with the Excursion Committee of the Association, the result of which was that their dredging excursion was adopted and carried out by the Plymouth Institution. At this excursion were present Dr. J. Gwyn Jeffreys, F.R.S., the President of the Biological Section, and other eminent members of the Association. It is gratifying to know that many Members of our Society took a warm interest in the proceedings; and it is owing, in a great measure, to their zeal and exertions that the Congress of the British Association at Plymouth in 1877 was so highly successful. The exhibition of pictures at St. Andrew's Hall, which was the best
ever arranged in the West of England, was managed almost entirely by Members of our Society.

There were two Conversazioni held during the Session, both of which were well attended. At the first, on October 11th, 1877, there was exhibited a collection of curiosities and photographs, illustrative of the habits of the natives and the produce of the little-known regions visited by H.M.S. *Challenger*, lent by Mr. Spry, R.N., an officer of the ship. The valuable collection of local fossils belonging to the Institution, which had been re-arranged by Mr. R. N. Worth, excited much attention in the museum, where also was a collection of prehistoric stone implements, lent by Mr. F. Brent. Mr. Square exhibited, by the aid of the Oxy-Hydrogen microscope, a series of photographs illustrative of glacial action, which were explained by himself; and during the evening some excellent vocal quartettes were rendered by Mr. Square and his friends.

At the second Conversazione, held on January 10th, 1878, the experiment was tried of having a purely scientific evening; this proved a success, and deserves to be repeated. The following apparatus was exhibited and explained:

The Telephone, lent by Mr. R. Bayly, explained by Mr. R. N. Worth, F.G.S.

The Harmonograph, Savart's Wheel, lent and explained by Mr. W. F. Webb.

The Monochord,

Gas Furnace, lent and explained by Dr. R. Oxland, F.G.S.

Radiometer, lent and explained by Mr. William Heath.

Nautical Instruments, lent and explained by Dr. J. Merrifield, M.R.A.S.

The Spectroscope, lent and explained by Dr. Codd.

In addition to the above were a valuable collection of coins and medals, lent by the Very Rev. Canon Woollett; a unique and very valuable collection of English gold coins, and of Roman gold coins of the Caesars, lent by Mr. J. E. Moon; the Devonport collection of diamonds, emeralds, rubies, &c., lent by the Mayor and Corporation, which was described by Mr. R. N. Worth; also a selection from the Crustacea obtained during the cruise of H.M.S. *Challenger*, which was explained by Mr. C. Spence Bate, F.R.S., with many other objects of great interest.

The Society has to regret the loss by death of Mr. R. Were Fox,
F.R.s., and Major-General Nelson, R.E., the first an honorary and the second a corresponding member of the Institution. It has also to regret the loss, by removal from Plymouth, of two highly-valued members, the Rev. S. Beal, B.A., M.R.A.S., and Mr. F. G. Landon, M.A., both Vice-Presidents for the present Session. Mr. Beal still however retains his connection with the Institution, having been unanimously elected an honorary member; and it is to be hoped that on some future occasions the Society may be favoured with others of his learned and thoughtful lectures.

The laws as revised at the last Annual Meeting have been printed, and copies can be supplied to those members who have not yet received them.

The Curator of the Library reports as follows:

"During the past year a considerable addition has been made to the books in the Library of the Plymouth Institution. The newly-acquired volumes have been obtained in the following ways: By presentation from Members or others interested in the Society; by receipts from kindred institutions in exchange for the ‘Transactions’; by the binding up of volumes in continuation of the serials subscribed for; and by purchase.

"The works that have been presented are the following: British Association ‘Report,’ 1876, from the Society; Devonshire Association, 1877, from the Society; ‘Sprigge’s Anglia Rediviva,’ 1647, ‘Huxham on Fevers,’ and ‘Huxham’s Observations’ (three works of local interest), from Mr. J. Brooking Rowe; ‘Ray’s Synopsis Methodica Stirpium Britannicarum,’ 1690; ‘Dalton’s English Traveller,’ 1794, from Mr. F. Brent; ‘Inscribed Stones and Ancient Crosses of Devon,’ part 1, from the author, Mr. C. Spence Bate; ‘Gatherings of a Naturalist in Australia,’ from the author, Dr. G. Bennett; Parts of ‘Proceedings’ of Geographical Society, from Mr. W. Square; Tales, Poems, and Masonic Papers, from the author, Mr. Emra Holmes; a pamphlet, entitled, ‘Here and there in Chaucer,’ from the author, Dr. Weymouth; another from Dr. R. W. Woollcombe, the author, ‘Some Reasons for the supposition that the Red Corpuscles of the Blood have Cycloidal Rotation’; ‘Notes on the Geology of Lewisham,’ from Mr. Johnston Lavis; and numerous Weather Charts, from Dr. Merrifield.

"The following have been received in exchange for the ‘Transactions’: From Dr. Hayden, of the United States Geological Survey—
'Geological Survey of Montana and adjoining Territories,' 1871;
'Lesquereux's Report on Fossil Flora;' 'Leidy's Contributions to
the Extinct Vertebrata Fauna;' 'Fur-bearing Animals;' 'Mono-
graph of North American Rodentia;' 'United States Geological
Survey,' vol. xi.; 'Survey of Colorado and adjoining Territories;
'Ethnology and Philology of the Hidatsa Indians;' 'Bulletin of
the United States Entomological Commission,' Nos. 1, 2; 'Bulletin
of the United States Geological and Geographical Survey,' vol. ii.
part 4, vol. iii. Nos. 1, 2, 3, 4; 'Catalogue of the Publications of
the United States Geological and Geographical Survey', 2nd Ed. ;
'First, Second, and Third Annual Reports (1 vol.) of the United
States Geological Survey for 1867–69;' 'The Grotto Geyser;
'Lists of Elevations;' 'Explorations under Dr. Hayden;' 'Mis-
cellaneous Publications,' No. 2; 'Meteorological Observations,'
No. 6. From the Zoological Society of London—'Proceedings,'
part iv. (1876), parts 1, 2 (1877); 'Natural History Transactions
of Northumberland and Durham,' vol. v. part 3, from the Tyneside
Club; 'Transactions of the Norfolk and Norwich Naturalists'
Society,' vol. ii. part 3, from the Society. The following from
the respective Societies—'Proceedings of the Somersetshire
Archaeological Society,' vol. xxii. (1876); 'Proceedings of the
Berwickshire Naturalists' Club,' vol. viii. No. 1; 'Proceedings of
the Bristol Naturalists' Society,' vol. ii. part 1 (1876–77); 'Pro-
ceedings of the Literary and Philosophical Society of Liverpool,'
vol. xxxi. (1876–77); 'Journal of the Royal Institution of Corn-
wall,' No. 19 (November, 1877), and Sixtieth Annual Report;
'Sixty-fourth Annual Report of the Royal Geological Society of
Cornwall;' 'Smithsonian Reports for 1875–76;' 'Quarterly Journal
of the Geological Society,' Nos. 130–33; 'Journal of the Royal
Dublin Society,' vol. vii. No. 44; 'Journal of the Royal Geological
Society of Ireland,' vol. iv. part 4, new series; 'Transactions of
the Botanical Society of Edinburgh,' vol. xiii. part 1; 'Atti della
Societa Toscana,' vol. iii. fasc. 1 (1877). From the Royal Society
of New South Wales—'Annual Report on Mines,' 1876; 'Russell's
Climate of New South Wales;' 'The Progress and Resources of
New South Wales;' 'Journal of the Royal Society of New South
Wales,' vol. x. (1877). With this last-named Society a corres-
pondence has been opened.

"The following works have been purchased: 'Carew's Survey

"The Librarian is sorry to have to report that 'Bottrell's Traditions and Hearthside Stories of West Cornwall' (first series) is missing from the Library, also 'Murchison's Silurian System,' 1814, and 'Shea's Animal Physiology.'

"Before concluding his Report, he has to bring before the Members of the Society a matter that demands their immediate attention—the want of additional shelves for the books. At present the compartments are filled to an extent that prevents a due arrangement and assortment of the volumes. The walls of the room afford sufficient space for the construction of one or two additional shelves above the present cases, on which works only rarely used might be arranged. He considers that the fixing of these shelves would be the best way of overcoming the difficulty. One other plan, however, suggests itself—the weeding out from the Library of all the works that might be considered of little or no value. He thinks, however, that the worth of many would be found to be so much a matter of opinion, that this latter plan would prove a difficult one to carry out."

The Curator of Fine Arts reports:

"The Society is to be congratulated on the acquisition of four valuable paintings during the past Session, which are now on the walls of the Lecture Hall."
"1st. A magnificent picture of Swiss Alpine scenery, which excited much attention at the Fine Arts Exhibition of the British Association, painted and presented by Sir R. P. Collier.

"2nd. A portrait of the late Mr. Macauley, formerly master of the Plymouth Grammar School, painted by Ball, presented by Mr. J. Williams Grigg, through the late Mayor, W. Foster Moore, Esq.

"3rd. A portrait of the late Sir William Snow Harris, F.R.S., painted by F. Lane, and presented by Mrs. Jacobson, of Woodland Terrace.

"4th. A portrait of the late Dr. S. P. Tregelles, LL.D., painted by F. Lane, subscribed for and presented by some Members of the Institution."

The Curator of Antiquities reports:

"A Barrow near Holsworthy was opened by members of the Society during the last summer, but no trace of an interment or relics was discovered.

"Mr. T. K. Dymond, F.S.A., having drawn attention to an interesting little Baptistry of the fourteenth century in Mount Edgecumbe Park, by the kind permission of the Earl, it was examined by some of our members, and a drawing with plans has been prepared by Mr. Hine for insertion in the 'Transactions.'"

The Curator of Zoology reports:

"The collection of British birds, most of them local, belonging to Mr. Julian, has been purchased for the Museum."

The Curator of Geology and Mineralogy reports:

"During the past year several valuable contributions of minerals have been made to our Museum, such as were much wanted. We have now a good, useful, mineralogical collection; but are wanting room for more complete classification and display. I have to acknowledge the important assistance rendered by Mr. R. N. Worth in the arrangement of the collection of local and geological specimens, which now assumes a valuable form, such as, with the aid of further promised contributions, will prove but little, if anything, inferior to the most important collections in Devon and Cornwall."
Mr. Worth has favoured me with the following remarks on the geological collection:

"The whole of the collections of fossils have been examined and sorted, duplicates set on one side in drawers specially appropriated to them, and the chief portion of the local fossils arranged in the glass-cases on the new drawers, so as to be open to inspection. The Society is to be congratulated on possessing a very valuable representative collection of local fossils, in some respects of peculiar interest, embracing specimens collected many years since, and which now would be quite unattainable. In the glass-case will be found suites of the Devonian fossils, not only of this locality, but from various parts of Devon and Cornwall, the Middle Devonian series, to which the Plymouth fossils belong, being particularly well represented. There is likewise a good collection of the Budleigh Salterton fossils, presented by Mr. Vicary, F.G.S., and an excellent set of the Carboniferous fossils of North Devon, largely added to during the present year by a present from Mr. Townshend Hall, F.G.S. Of the ordinary Liassic fossils of the eastern borders of the county there is a good typical collection, and also of the Cretaceous fossils of Haldon and Blackdown, given by Mr. Vicary. The collections illustrating the ossiferous caverns of the county are large and valuable; and although the Oreston caves are represented more largely than importantly, the Hoe fissures and Yealmpton caves are fully illustrated, and there are also several of the original specimens found in Kent's Hole by Mr. McEnery and Mr. Northmore. In these, as in many other instances, the value of the specimens is enhanced by the fact that they were given to the Institution by the pioneers in the work of Devonian geology, including, in addition to those mentioned, the Rev. R. Hennah, Mr. J. Prideaux, Mr. Bellamy, Col. Harding, Mr. S. R. Pattison, &c. The general collections of fossils are classified in drawers. The divisions best represented are the Silurian, Carboniferous, and Cretaceous. There are a few Oolitic and Tertiary fossils, and some interesting foreign specimens; but a good deal would require to be done to make this part of the collection what it should be. The local fossils are in great part mounted, and many of them are named; but here also much work remains to be done. It is however a matter of considerable gratification that some progress has been already made, and that your large collection is no longer scattered about in drawers, unregarded and unknown, but is, if imperfectly, still in
some degree available for examination and inspection. A little further expenditure of money, and somewhat more of time, would show that the palæontological collection of the Plymouth Institution is well worthy of it and of the town."

FRANCIS BRENT, \textit{Hon. Secs.}
WILLIAM SQUARE, \textit{Hon. Secs.}
TREASURERS' REPORT.
1877-78.

The amount actually received for annual subscriptions is less than that of last year, but there are several Members living out of the town who have not remitted the sums due. Reckoning these, the amount is much as usual. The Hall has been used more frequently than of late, and the payments on this account, £27 5s., are in excess of those received for several years past.

Voluntary contributions towards the purchase of the Julian collection of birds, amounting to £9, have been received by your Treasurers. The proprietor of this collection kindly offered to wait six months for the payment of the balance, £25, due on this account, and further donations will be acceptable. Several Members and Associates have purchased of Mr. Lane his portrait of the late Dr. Tregelles, and presented it to the Institution. It is wished to commission Mr. Opie to paint a portrait of Mr. Rooker if the necessary funds are forthcoming. The expenses have not been so heavy as they were last year, and the expenditure under nearly every head shows a decrease; but the printing and stationery account is large, and the expenses of the dredging excursion in connection with the British Association involved an outlay of nearly £10, which was, however, money well spent, identifying as it did the Institution more closely with the visit of the Association in a very satisfactory way. Had it not been for these items the debt would have been further reduced. As it is, it now amounts to £175 3s. 11d. as against £209 11s. 4d. last year, showing a diminution to the extent of £34 7s. 5d.

J. BROOKING ROWE, Hon.
S. CATER, Treasurers.

April 4th, 1878.
### BALANCE SHEET

of

The Plymouth Institution and Devon and Cornwall Natural History Society.

For the Year ending 4th April, 1878.

<table>
<thead>
<tr>
<th>Description</th>
<th>£</th>
<th>s.</th>
<th>d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>To Library and Binding</td>
<td>36</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Lighting and Warming</td>
<td>11</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Salaries and Commission</td>
<td>16</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Interest</td>
<td>9</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Repairs, &amp;c.</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Dredging Excursion</td>
<td>9</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>Taxes, Insurance, &amp;c.</td>
<td>5</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Reports and Illustrating</td>
<td>45</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Museum</td>
<td>25</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Conversazioni</td>
<td>6</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Petty Disbursements</td>
<td>8</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Printing and Stationery</td>
<td>16</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>Balance last year</td>
<td>109</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
<td>303</td>
<td>1</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>£</th>
<th>s.</th>
<th>d.</th>
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<tbody>
<tr>
<td>By Annual Subscriptions, at 21/-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Subscriptions of Lady and Junior Asso-</td>
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<td></td>
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<tr>
<td>ciates, at 10/6</td>
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<td></td>
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<tr>
<td>Arrears of Subscribers</td>
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</tr>
<tr>
<td>Rent of Hall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donations towards purchase of Julian Collection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Income</strong></td>
<td>179</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

**Total Income - Total Expenses =**

<table>
<thead>
<tr>
<th>Description</th>
<th>£</th>
<th>s.</th>
<th>d.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Balance down</strong></td>
<td>75</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>

We have examined the foregoing Account and Balance Sheet, and have compared them with the Vouchers, and find the same correct.

4th April, 1878.

**Auditors:**

JAMES C. INGLIS

E. G. BENNETT
An ABSTRACT from the METEOROLOGICAL REGISTER, from 1st January, 1876, to 31st December, 1877, kept at the Navigation School, Gascoigne Place, Plymouth (Lat. 50° 22½' N., Long. 4° 7¼' W.), by JOHN MERRIFIELD, LL.D., F.R.A.S., F.M.S.

<table>
<thead>
<tr>
<th>MONTH</th>
<th>BAROMETRICAL PRESSURE REDUCED TO MEAN SEA LEVEL AT 32° FAH.</th>
<th>TEMPERATURE</th>
<th>HYGROMETER</th>
<th>RAINFALL</th>
<th>DIRECTION OF WIND AT 8 A.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Barometer</td>
<td>Maximum for Month</td>
<td>Minimum for Month</td>
<td>Average in shade</td>
<td>Average Minimum</td>
</tr>
<tr>
<td>1877</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>29.803</td>
<td>30.569</td>
<td>28.787</td>
<td>40.81</td>
<td>40.19</td>
</tr>
<tr>
<td>February</td>
<td>30.033</td>
<td>30.364</td>
<td>29.404</td>
<td>51.91</td>
<td>41.54</td>
</tr>
<tr>
<td>March</td>
<td>29.803</td>
<td>30.397</td>
<td>28.735</td>
<td>50.31</td>
<td>36.40</td>
</tr>
<tr>
<td>April</td>
<td>29.707</td>
<td>30.214</td>
<td>29.044</td>
<td>54.18</td>
<td>42.73</td>
</tr>
<tr>
<td>May</td>
<td>29.880</td>
<td>30.336</td>
<td>29.286</td>
<td>57.57</td>
<td>44.07</td>
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<tr>
<td>June</td>
<td>29.966</td>
<td>30.275</td>
<td>29.226</td>
<td>67.35</td>
<td>54.90</td>
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<td>July</td>
<td>29.971</td>
<td>30.381</td>
<td>29.303</td>
<td>67.52</td>
<td>55.13</td>
</tr>
<tr>
<td>August</td>
<td>29.883</td>
<td>30.184</td>
<td>29.336</td>
<td>67.40</td>
<td>54.46</td>
</tr>
<tr>
<td>September</td>
<td>30.074</td>
<td>30.371</td>
<td>29.700</td>
<td>61.56</td>
<td>48.42</td>
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<tr>
<td>October</td>
<td>30.040</td>
<td>30.581</td>
<td>29.169</td>
<td>58.42</td>
<td>44.59</td>
</tr>
<tr>
<td>November</td>
<td>29.719</td>
<td>30.455</td>
<td>28.698</td>
<td>54.03</td>
<td>41.88</td>
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<td>December</td>
<td>30.078</td>
<td>30.662</td>
<td>29.250</td>
<td>48.28</td>
<td>38.25</td>
</tr>
<tr>
<td>Average for 1877</td>
<td>29.916</td>
<td>30.399</td>
<td>29.162</td>
<td>52.95</td>
<td>41.64</td>
</tr>
<tr>
<td>Average for 13 Years</td>
<td>29.942</td>
<td>30.392</td>
<td>29.305</td>
<td>54.14</td>
<td>41.69</td>
</tr>
</tbody>
</table>

The observations are all made at eight a.m. The Rain Gauge is by Casella, and is 8 inches in diameter; its top 9 feet 2 inches above the ground, and 75 feet above the mean level of the sea. A rainy day is one in which not less than 1-100th of an inch falls. The instruments have all been supplied by the Meteorological Committee of the Royal Society, compared at Kew, and the index error supplied to each.
Mr. Vice-President, Ladies and Gentlemen,

This year of our Lord, 1877, is notable as being the 400th anniversary of an event which, for good and evil, has had an influence upon England which no one can hope to gauge.

On the 30th of June last, in the Conservatory of the Royal Horticultural Society, South Kensington, a distinguished company under the Presidency of the Right Hon. W. E. Gladstone, M.P., met to inaugurate the Caxton Celebration, and so to mark the close of the fourth century since William Caxton first introduced the Art of Printing into our country. A most interesting collection of the methods and results of printing of every kind was brought together. The processes of type-casting, composing, stereotyping, electrotyping, and printing, were shown in actual operation, and almost every kind of printing-machine since Caxton's time was exhibited. But the chief attraction was a collection of Caxton's actual work, more complete than has ever been secured before, although connoisseurs have a goodly number of his works in their possession. Amongst these treasures there was the first book ever printed in English, "The Recuyell of the Histories of Troy," printed by Caxton, probably at Bruges, in 1474; and, as the most interesting of all, there was the first book ever printed in England, "The Dictes and Sayings of the Philosophers," bearing the date 1477, and furnishing the basis of the Celebration itself.

Such an event, both in itself and in all that it suggests, is a most tempting subject for the address which, in the discharge of my
duty as your President this year, I am called upon to deliver. But as in Optics the largest object to our vision is not that which is largest in itself, but that which is nearest to the eye, so in the present case another event, not so important nor reaching so far in its results, but of more immediate and local interest, presents more pressing claims to our attention.

I need not say that I refer to the visit to Plymouth of the "British Association for the Promotion of Science," a Society which has on its roll the names of the most distinguished men in almost every department of science. Such a visit could not fail to be of the highest interest to the town in general, and to the members of this Institution in particular. Our position indeed in the scientific world is far too humble to admit of our taking any leading part in the entertainment of the Association in a corporate capacity, but through the individual action of our members the Plymouth Institution has done almost more than its full share in making the visit of the distinguished guests both pleasant and successful.

Looking through the list of local officers elected for the occasion, we find that the three Secretaries were each for some years the Hon. Secretaries of our Institution (Mr. W. Adams, Mr. W. Square, and Mr. H. Whiteford), and an Ex-President and member of our Council (Mr. C. Spence Bate, F.R.S.), had the honour of being elected one of the Vice-Presidents of the Association. The Institution was represented among the Secretaries, and other officers, of every Section, viz.:

Section A.—Mathematical Science. Mr. F. G. Landon, M.A.
Section B.—Chemical Science. Dr. Oxland, F.C.S.
Section C.—Mr. W. Pengelly, F.R.S., F.G.S. (President)
Section D.—Biology. Mr. F. Brent, Mr. J. B. Rowe, F.L.S., F.S.A.
Section E.—Geography. Mr. F. E. Fox, B.A., F.R.G.S.
Section F.—Economic Science. Mr. W. F. Collier.
Section G.—Mechanics. Dr. Merrifield, F.R.A.S.

Of the real work done in these various Sections, a fair share was also taken by our members. On the first day, Aug. 16th, Mr. Landon read a paper in the Mathematical Section, "On the Tendency of Heavenly Bodies to Centralize and Applanize, if subject to resistance in their Motions;" Mr. Spence Bate read his "Report on the present state of our knowledge of Crustacea," which will be published in full in the Transactions; and Mr. R. N. Worth, F.G.S., in the Geological Section, read a paper "On the Paleontology of Plymouth." On the second day, Aug. 17th, Mr. T. Archer Briggs, F.L.S.,
in the Biological Section, read a paper "On the Roses of the Neighbourhood of Plymouth." On the fourth day, Aug. 20th, Dr. Merrifield, in the Mathematical Section, read a paper "On the Meteorology of Plymouth," and in the Mechanical Section, Mr. R. N. Worth, one on "The Government Establishments of Plymouth and Neighbourhood." Your late President (Rev. Professor Beal, B.A.), in the Biological Section, exhibited and described a Buddhist Figure, which he pronounced to be unique of its kind. Mr. C. Spence Bate described the "Antiquities of Dartmoor," in Section D. On the fifth day, Aug. 21st, in the Biological Section, Dr. W. H. Pearse read a paper "On the Geography of Consumption in Devon." On the third day of the Meeting, Aug. 18th—a day devoted to Excursions of various kinds—our Institution was more directly identified with the Association by a Dredging Excursion conducted under our auspices. In reply to an application by your President, the Admiral Superintendent of the Devonport Dockyard courteously placed the steam-tug "Perseverance" at our disposal. About sixty visitors accepted the invitation of the Committee, and under the guidance of Dr. Gwyn Jefferys, F.R.S., assisted by Mr. William Hearder, who kindly supplied the dredging apparatus, they steamed out of harbour for the Melampus buoy. Here the dredge was set to work, and a most successful haul of various crustacea and sea-weeds was made; the experiment was repeated near Redding Point, and again in Whitsand Bay, with fair success. The hauling up of the dredge was a time of much excitement, and we understand that many of the specimens were of sufficient value to be taken away for preservation by those who were so fortunate as to secure them.

But while thus hastily glancing at some of the incidents of a week that will not soon be forgotten by those who shared in its engagements, our interest naturally concentrates on the Inaugural Address of the President. This annually marks the last point of advance reached by the ever-rolling tide of scientific discovery, by a general survey of the various fields of science, or by a more special and exhaustive treatment of some particular section of it. The President of the year (Dr. Allen Thompson, F.R.S.) chose the latter course. This choice, and his mode of handling his subject, called forth some criticism unfavourable to its repetition; but we venture to think that it is the course which will be more and more frequently, and of necessity, adopted in years to come. The range of scientific enquiry is becoming so wide, and the investigation of
its various departments so minute and searching, that it will soon become impossible, if it is not already so, to describe, much less to discuss, within the limits allowed to the President's address, all that may have been discovered from time to time in Chemistry, Geology, Geography, and other branches of science.

This is the opinion of Dr. Thompson, for in justifying the course adopted in his address he thus summarises the work before him: "If, confining ourselves to the department of Biology, we add the discovery by microscopical observation of the minuter elementary forms of organisation, the later discovery and investigation of living protoplasmic substances, the accumulated evidence of progressive types of animal and vegetable forms in the succession of superimposed strata composing the crust of the earth, the recent discoveries as to conditions of life at great depths of the ocean, the vast body of knowledge brought together by the labours of anatomists and physiologists as to the structure and functions of almost every plant and animal . . . . we shall be able to form some conception of the enormous extension in our time of the basis of observation and fact, from which biological phenomena may now be surveyed, and from which just views may be formed as to their mutual relations and general nature."

If this were not so, there are obvious advantages in the course adopted by the President. In him, as in most of his predecessors in that honourable office, we have a man who has devoted the best of his life and ability to a special subject; he is therefore of all others best able to expound that subject, and to report to his fellow-workers in other departments the latest results of his investigations. It may be said that all this will be secured by publication in another way, and at another time, while the miscellaneous character of the audience on such an occasion must render the careful treatment of any special subject uninteresting, and perhaps unintelligible, to many present. But it is fairly replied, that the British Association is a Society for the learned, and not for the unlearned; for the extension, not the diffusion, of scientific knowledge. It appeals to those who have themselves learned the value of patient investigation, and who are willing to yield to enquirers in one branch of science the consideration and patience which they in turn demand for themselves. Further, the instant and wide publicity, through the agency of the press, which is secured by the announcement of any new discovery from the President's chair, will, in the estima-
tion of the true student, more than counterbalance any inconvenience or passing annoyance that may be felt by the rank and file of pseudo-philosophers; men who are better pleased to discuss, sometimes in flippant style, the discoveries of others—*tamquam modo ex deorum concilio et ex Epicuri intermundis descendissent*—than to spend time and patience in the careful verification, or the laborious refutation, of the results of which they speak so lightly.

Certainly the address before us was not intended for such as these. It is characterised by a minuteness of detail and closeness of reasoning which at once excite our admiration, and test our power of continued and prolonged attention. It is also characterised by what seems to be a leading feature in modern scientific enquiry, fearlessness in adopting any conclusion which is assumed to be inevitable, with perhaps something like haste in reaching the assumption that it is so. This doubtless is the result of the breadth and candour which belong to those to whom everything in heaven or on earth is an open question, and whose readiness to accept a conclusion, however hypothetical, is only equalled by their eagerness to reject it as soon as it is proved by later discoveries to be untenable. No one can grudge our savans such liberty, but we may bespeak their forbearance towards others who, still trammelled with scientific beliefs which would make the new garment both cumbersome and incongruous, are thereby made as willing to wait for a still newer fashion, as at once to assume that which is offered as the latest and most approved.

Dr. Thompson took as his subject the "Development of the Forms of Animal Life," and he avows himself at the outset a firm follower of Charles Darwin. He holds that "the cautious naturalist receives with the greatest reserve"—by which we understand that he does not receive it at all—"the statement of fixed and permanent specific characters as belonging to the different forms of organized beings, and is fully persuaded of the constant tendency to variation which all species show even in the present condition of the earth, and of the still greater liability to change which must have existed in the earlier periods of its formation;" that, "so far from being the direct product of distinct acts of creation, the various forms of plants and animals have been gradually evolved in a slow gradation of increasing complexity . . . . in the long but incalculable lapse of the earth's natural mutations."

The note thus struck is maintained throughout, and consciously
or unconsciously the address is a disquisition on Darwinism, or Darwinism illustrated by the development of the forms of animal life. Darwinism pushed to its ultimate conclusions, leads to the theory of Evolution, and we are not therefore surprised to find the learned President drawing the conclusion that "it is impossible for any one to be a faithful student of embryology, in the present state of science, without at the same time becoming an Evolutionist."

The saving clause of this judgment deserves, as it receives, our gratitude. As we look back on the past thirty or forty years, we can think of more than one exploded theory of which the same thing might have been said; theories on the nature of light, of heat, of electricity, of the origin of the primary rocks—so-called—of the constitution of the sun, and others. It may be quite as wise, and more philosophical, therefore, "in the present state of science," to suspend judgment for awhile on the theory of Evolution, which is as yet scarcely twenty years old, lest, like one of olden time whose vision was still imperfect, we "see men as trees walking."

Dr. Thompson's address may confirm the faith of those who have accepted the doctrine of Evolution, but there is nothing in it that obliges those to accept it who have hitherto been unable to adopt it.

It is unnecessary, and it would be out of place to attempt, to analyze the address in detail, but there are two or three points in it which claim our attention.

Dr. Thompson first traces the growth of plants by showing in a most interesting way that the essential part of the process of production is the formation of two cells of different kinds which, by themselves, have no power of further growth, but which by their union give rise to a product in which the power of development is raised to the highest degree; and that the two cells when united produce a mass usually spherical, which is the embryo of the future plant. Passing from plants to animals, he shows that the ovum, also more or less spherical in form, presents the essential characteristics of a complete cell, thereby establishing a strict analogy between the development of a plant and that of an animal. Dr. Thompson then anticipates any difficulty that may be found in the immense disparity of size in various animals, by showing that however much the mature animals may differ—as for example the elephant and the mouse, which in size are as 150,000 : 1—yet there is scarcely any difference in the size of the ovum, and the same elementary structure is maintained in both.
He next traces with some minuteness the process of yolk-segmentation in the egg, and shows that there is a strict analogy between the development of the embryo of the bird and of the mammal; and finally concludes that a survey of the whole animal kingdom, from the simplest animal up to man himself, will show that all the various modifications of organic structure which present themselves, spring originally from two cellular laminae, the *ectoderm* and *endoderm*; the component elements of which may be again traced back to the first segment sphere and primitive protoplasmic elements of the ovum.

The investigation thus indicated is of the highest interest, and we follow our guide with ever-increasing pleasure as he builds up, layer by layer, the wonderful structure of the animal frame. In this, the *ontogenetic* history of animals, as he calls it, all must remain willing disciples at their master’s feet. But when he passes from the history of the individual to the *phylogenetic*, or race-history of the formation of animals and man, the master’s theory may perchance seem, even to willing disciples, to be running ahead of his facts, and his generalisations to be made too rapidly.

His argument is somewhat as follows: If the changes by which the complex organization of the body is gradually built up out of its elementary materials, in individuals belonging to different classes and orders of animals, are found to be not only *not different*, but on the contrary, to present features of the *most remarkable resemblance* and conformity, then we may conclude that there is a general plan of development extending to the members of considerable groups, and possibly capable of being traced from one group to another.

"But this is clearly nothing less than another way of stating that there is a similar type of structure pervading the animals of each group, and a probability of a common type being ascertained to belong to them all."

Illustrations are then given of this remarkable correspondence in gradation and development of type in animals of different orders.

1. From the process of incubation in the chick.

2. From the formation of the *chorda dorsalis*. This exists as a primordial structure in the embryo of all vertebrates, including man himself, and is to be found among the invertebrates in the larva of the Ascidia—the latter being a mollusc without head or shell, having two orifices nearly on a level, and shaped like a leathern bottle (hence its name, from Greek ἄσκος), having no motion beyond
the expansion and contraction of these orifices, and spending its whole life rooted to the rock or shell as firmly as the plant is rooted to the earth.

3. A third illustration is drawn from the similarity of plan which may be traced in the region of the face and neck, including the apparatus of the jaws and gills.

4. A fourth from the history of the development of the first pair of arches, which "includes the basis of the formation of the lower jaw with the so-called cartilage of Mœchel, and which, while furnishing the bone which suspends the lower jaw in reptiles and birds, is converted in mammals into the hammer-bone of the ear."

5. A fifth illustration is found in the comparative anatomy of the heart and its mode of formation in the embryo, which furnishes most striking illustrations of the relation between entogenetic and phylogenetic development in the vertebrates, and is not without its application to some of the invertebrates.

The list is closed by a slight reference to the malformation to which the heart is subject, and due to the persistence of transitory conditions which belong to different stages of progress in the development of the embryo, and a hasty glance at the affinity which may be traced between organs of circulation and respiration which at first appear to belong to very different types, but which may be identified both in vertebrates and, through the Amphioxus and Ascidian, in the invertebrates also.

As the result of this process of investigation and comparison, Dr. Thompson is convinced that, "the phenomena which have been ascertained as to the first origin and formation of textures and organs in any individual animal are of so uniform a character as to indicate forcibly a law of connexion and continuity between them;" and he is "equally convinced of the similarity of plan in the development of the larger groups, and to some extent of the whole."

He considers it therefore "impossible for any one to be a faithful student of embryology, in the present state of science, without at the same time becoming an Evolutionist," and regards it as "no exaggerated representation of the present state of our knowledge to say, that the ontogenetic development of the individual in the higher animals repeats, in its more general character and in many of its specific phenomena, the phylogenetic development of the race."

But surely another conclusion may with equal reason and as great fairness be drawn from the phenomena of embryology which Dr.
Thompson has so ably described. This wonderful agreement of structure and similarity of plan may only show that the Architect and Designer of each and all is the same; that His plan is the same, and His mode of development the same; that all have one common origin and source, as the products of the same Divine intellect; but they do not necessarily show that any one type is the development or result of another. There is nothing in the President's address (as we read it) which compels us to suppose, or which even enables us to suppose, that among living animals the Ascidian, for example, is the lowest type of Man, and Man a fully developed Ascidian. The primitive cell which produces the Ascidian may be perfectly similar in its development, and yet essentially distinct in its character, from the primitive cell which produces Man, or any of the higher forms of animal life. We have no difficulty in believing that the formative or organizing power does (as Dr. Thompson maintains) reside in "the living substance of every organized cell, and in each of its component molecules, and is a necessary part of the physical and chemical constitution of the organizing elements in the conditions of life." But it has not been proved, nor has any approach to the proof been reached, that the living substance of one organized cell contains in it the elements of some other organised cell which, when developed, will produce an animal of altogether different character, habits, and capabilities. Until that proof is presented, the investigations of embryologists point only to Development, about which there is no dispute; they fall short of Evolution, and leave it a baseless fabric, an unrealised dream, a mere hypothesis.

The older scientific theory, that every distinct species is the result of a distinct act of the Creator, introducing some new element or more fully developing what already exists, is perfectly consistent with all the facts of embryology described by Dr. Thompson, and sufficient to account for them; and, "in the present state of science," we think it the more rational theory of the two.

The Evolutionist hitherto has failed to get out of the circle of species. His investigations within that circle are most interesting, and fill us with ever-increasing wonder at the marvellous skill and boundless resources of the Great Artificer; but they do not take us from the "Species" to the "Genus," or even from one species to another. They give us links, as they suppose, of the great chain of Being which connects the highest with the lowest forms
of life in one grand series of cause and effect; the result of countless myriads of ages, reaching far back to an indefinitely extended past. But the links are unconnected, and the chain is therefore still unmade.

As to the real existence of that chain, all are agreed. The older philosophy teaches that the links are forged together by a distinct act of the Creator's will; the Evolutionist seeks to find it, and has yet to find it, in some law of causation acting on the links and growing out of them; each link evolved from that which went before, to produce in turn another link, a step higher in the scale of Being.

Granting, however, that the conclusion reached by the new philosophy were less of an assumption than we are compelled to think it is; granting that all that Dr. Thompson desires to find, and thinks he ought to find, were found—so that from the Ascidian, a creature without sense or motion, almost a plant, up to the Lion, the highest development of activity and strength; or the Elephant, the fullest development of size; or the Dog, the most perfect development of sagacity; the chain of connection could be distinctly traced link by link without obscurity or doubt; granting all this—there are still two awkward breaks in the chain which it seems impossible to unite; one allowed in so many words to be so by Dr. Thompson, the other, though not yet fairly faced, equally impracticable to any means that the embryologist can command. I mean,

The origin of Life; and
The origin of Speech.

Evolution, as a scientific theory of creation, must apply of course to all, and not simply to some part of our world. Those who accept it do not hesitate to allow this. There is no reason therefore, in tracing the development of life, why the enquiry should be stopped at any point short of the first origin of all things. There is no reason, for example, why our enquiry should stop at the Ascidian. Let it go still backwards; and if Evolution is true, we can go back and back through the lowest types of vegetable life, and from that to forms without life, until we reach the first elements—carbon, oxygen, hydrogen, and the like—which must be the true source and spring of all things, animate, inanimate, moral, mental, and physical. This would be a perfect theory of Cosmic Evolution: the atoms of oxygen, carbon, hydrogen, and what not, at one end of the series; living, speaking, thinking, immortal man at the
other. There is a charm in a theory so logically complete, and so adequate for all cosmic purposes, which goes far to reconcile us to an origin so obscure and humble. But unfortunately for the theory, the link which is to connect the dead stone and the living animal cannot be found, and is allowed even by Evolutionists to have baffled discovery.

The importance of this fact is fully recognized by all scientists. Dr. Thompson says, "the importance of the right solution of this problem" (of the origin of life) "is one of wide significance, seeing that if it shall be satisfactorily proved, or even rendered probable, that in the course of Cosmical Development all the various kinds of plants and animals have been gradually produced by Evolution out of pre-existing simpler forms, and thus the whole series of organized beings in nature has been shown to be one of hereditary connection and derivation, then it would follow that the history of the origin of the simplest organisms may be the key to that of the first commencement of life upon the earth's surface, and the explanation of the relation in which the whole succeeding progenies stand to their parental stocks." But the conclusion reached, in spite of every desire to the contrary, is unfavourable to any such possibility; and Dr. Thompson, with Huxley, Tyndall, and other leading scientific men, confesses that "no development of organisms, even of the most simple kind, has been satisfactorily observed to occur in circumstances which entirely excluded the possibility of their being descended from germs, or equivalent formative particles, belonging to pre-existing bodies of a similar kind."

In other words, the hypothesis of spontaneous generation, which would have given such completeness to the theory of Evolution, falls to the ground, and by its fall the theory itself is seriously shaken.

The President is too good a philosopher to seek the origin of life "in conditions coeval with the first existence of physical and chemical properties" in other bodies, because the basis of the theory of Evolution rests on the hypothesis that all the materials composing the present earth were once in a state of incandescent heat, in which its materials could exist only in the form of a vaporous mass. Sir William Thompson, indeed, came afterwards to the rescue, by suggesting that all life in general, and the Colorado beetle in particular, came, or may have come, to our planet by a meteorite. But Cosmic Evolution must include the meteorite
and all contained in it; and the origin of life remains a problem still unsolved.

The second break in the chain of evidence of the truth of Evolution is the Origin of Speech, or, as some would say, the Origin of Reason. This question has not yet received from modern philosophers the attention which it deserves. Scientists have been so engaged in the discussion of the origin of life, and in the investigation of its development in the lower forms of life, that there has been little opportunity for enquiring into a development much more remarkable than any hitherto examined. Dr. Thompson does not refer to it, however remotely, in his address. Indeed there seems to be something like unwillingness on the part of physical philosophers to face the question at all, or to deal in any way with the phenomena of consciousness, which is essentially connected with it. They prefer to have to do with that which they can see, and handle, and analyze. The microscope and the blowpipe are their favourite instruments; with these they are perfectly at home; but they are unused to the methods of self-introspection and mental analysis which are alone of any service in investigating the phenomena of mind, and of that which is its outward expression—the gift of speech. This faculty, however, is as patent a fact as that of life itself. Man possessed of speech, and thereby giving evidence of a high mental development, has to be accounted for; as much as the elephant or dog possessed of great sagacity and intelligence, but destitute of speech and incapable of acquiring it. This fact has to be faced by Evolutionists, and until it is sufficiently explained, their theory must remain unproven.

We are aware that much is made of Instinct, or, if the word be objectionable, the low type of Reason, found in many animals. No one ever had a pet dog or cat but has some interesting anecdotes of what they have done, to the intense gratification of their rational friends. But nobody has ever heard of what these clever dogs or cats have said; of their ever having been taught to speak, and still less of their having learned to do so. The chasm between Man, the speaking animal, and the Brute, the dumb animal, is both broad and deep; as broad and deep as that between the dead and living substance.

The theme is attractive, but the question is not before us to-night, and as yet has hardly come fairly under the notice of the Evolutionist; but we may observe in passing that the difficulty of the
question, from an Evolutionist's point of view, seems to be greatly increased by the fact that the animal most nearly resembling man in outward form, does not most nearly resemble man in sagacity or intelligence. A monkey is not to be compared to a dog, whether for its intelligence or its fidelity; and in all respects is an inferior animal to it.

There is yet another means of testing the soundness of the theory so unreservedly adopted by the President of the Association; and that is, by the conclusions reached by Palæontologists.

It is pretty well agreed that the real basis of the theory must be found in the records of the past history of the earth. Objections made to the theory on the ground that no single case of the evolution of one species from another has been discovered, are at once met by a plea for time. Give the Evolutionist time enough, have patience and wait, and all will be made plain. No reasonable Evolutionist can demand more time than is allowed to him in the indefinite lapse of ages offered by the geologist; and in the "Testimony of the Rocks" he ought therefore to find his theory.

That testimony is against him.

The President of the Geologists' Association, William Carruthers, Esq., F.R.S., F.L.S., F.G.S., Keeper of the Botanical Department in the British Museum, in his Inaugural Address at the last Session, 1876-77, gives the result of his enquiries in his own department of science—the Fossil Flora. He discusses the evidence in favour of Evolution furnished by the Monocotyledons and Dicotyledons of the geologic periods.

Of the first he says, "The evolution of the Vascular Cryptogams and the Phanerogams, from the green sea-weeds through the liverworts and mosses, must have been carried on through a long succession of ages, and by an innumerable series of gradually advancing steps; and yet we find not a single trace of the early water forms, or of the later and still more numerous dry-land forms. The complete absence of such forms, and the sudden and contemporaneous appearance of highly-organized and widely-separated groups, deprive the hypothesis of genetic Evolution of any countenance from the plant record of the (older Palæozoic) rocks. The whole evidence is against Evolution, and there is none in favour of it."

Mr. Carruthers next proceeds to the consideration of the Dicotyledons. Their testimony he regards as more important.
1. Because of their higher organization.
2. From the existence of numerous differences which supply generally obvious and well-defined characters for their systematic classification.
3. From their appearance in strata of comparatively recent age, which are better known than Palæozoic deposits.

He discusses the position geologically of the three great groups—Apetaæ, Monopetaæ, and Polypetaæ—and finds that the lower group is not to be found where, by the theory of Evolution, it ought to be found, and would be found if it formed part of the then existing vegetation; while in higher strata—the Upper Cretaceous for example—representatives of the three groups are found together in the deposit, and these “divisions are represented not by generalized types, but by differentiated forms, which, during the intervening epochs, have not developed even into higher generic groups.”

Moreover these groups, since Dicotyledons first appeared, have continued through all the intervening periods, and still hold their place among existing forms of vegetation. As an instance of this, Mr. Carruthers takes the willow (Salix polaris), found in the lowest pre-Glacial beds at Cromer, and in deposits of the same age at Bovey Tracey, a plant still living in the Arctic regions.

Of this plant he says that—“The earliest Dicotyledon takes us not a step further back in the phylogenetic history of Salix than that supplied by existing vegetation. All beyond the testimony of our living willows is pure imagination, unsupported by a single fact . . . the evidence is against Evolution, and there is none in favour of it.” He concludes therefore, that “the whole evidence supplied by fossil plants is opposed to the hypothesis of genetic Evolution.”

From Fossil Plants we turn to Fossil Animals, and here also we are able to appeal to a witness, whose ability and familiarity with his subject are beyond all question.

Mr. Thomas Davidson, F.R.S., F.G.S., has contributed three articles in the Geological Magazine of the current year, in answer to the question, “What is a Brachiopod?” He tells us that he has devoted the best portion of his life to the study of the Brachiopoda. The Brachiopod is a bivalve, with the shell “varying generally from a quarter of an inch to about four inches in size, in certain species reaching to nearly a foot in length by something less in
breadth;" the outer surface of many of the species presenting exquisite sculpture, with brilliant shades, stripes or spots, of green, red, yellow, and bluish black. It is in every case an inhabitant of the sea, different species living at different depths, varying from four inches to 2,600 fathoms. At the latter depth, between Kerguelen Island and Melbourne, the dredge of the *Challenger* brought up "a very elegant little Brachiopod."

As far back as 1853 Mr. Davidson wrote a monograph on "British Fossil Brachiopoda," and has since that time been accepted as an authority on the subject. In 1861 Mr. Darwin wrote to him to suggest that the group of Brachiopoda would supply an admirable field for establishing the position that "the fauna of any formation is intermediate in character between that of the formation above and below." Mr. Davidson willingly accepted the suggestion, but writes: "I am bound to state that I have found the subject beset with so many apparently inexplicable difficulties, that year after year has passed away without (my) being able to trace the descent with modification among the Brachiopods which the Darwinian doctrine requires."

He is quite prepared to accept this doctrine. It is in his opinion "a tempting and beautiful theory," bearing a charm which is almost irresistible, being a far more exalted conception than that of constant independent creations. But it is stopped by questions which seem to plunge it in a maze of inexplicable and mysterious difficulties; and he concludes with this frank confession, which, coming from him as an unwilling, and yet perfectly honest witness, must have unusual weight. "Although far from denying the possibility or probability of the correctness of the Darwinian theory, I could not conscientiously affirm that the Brachiopoda, as far as I am at present acquainted with them, would be of much service in proving it."

But the increasing length of this paper, and the fear of wearying you, warn me to bring these remarks to a close. Sufficient has been said to justify a protest against the conclusion reached by the President of the British Association, that "the faithful student of embryology must become an Evolutionist." We have seen that it is possible to be a faithful student of *paleontology* without becoming an Evolutionist; nay, that it is almost impossible to be a faithful student of *paleontology*, and to become an Evolutionist. The facts of *paleontology* are directly in the teeth of the theory,
and compel those who study them, willingly or unwillingly, to withhold assent to it. We have seen also that the investigations of embryologists do not necessarily lead to the conclusions drawn from them by Dr. Thompson; that they are not inconsistent with the older philosophy which recognises in a distinct species a separate act of creation. We have noted further that no single case of Evolution of one species from another has ever yet come under the observation of scientific men. "The plants portrayed on the ancient paintings and sculptures of Egypt, the fruits placed in coffins with embalmed bodies, and the fruits and seeds found in ancient lake-dwellings, all belong to existing species, with which they agree in the most minute and apparently accidental particulars." (Carruthers, Address, p. 19.)

And, moreover, if this were not so, there are the two problems of the Origin of Life, and the Origin of Articulate Speech, at present apparently unsolvable, whose solution is essential to the completeness of the theory.

Under these circumstances, in spite of the earnest advocacy of its disciples, and in spite of addresses so able and so interesting as that of Dr. Thompson, we are compelled to conclude that the theory of Evolution, if not actually disproved, is certainly "not proven;" that, "in the present state of science," the evidence against it is stronger than that in its favour. Indeed, it is an open question whether it may not have already played its part in the dream-world of the philosopher's brain, and be destined soon to fade into some equally attractive, but possibly wholly antagonistic, theory; to be as eagerly supported by enthusiastic admirers as her then discarded sister.

Let it not be said that there is too great readiness on the part of those who are unwilling to leave old paths without sufficient reason, to accept and endorse what tells against anything new. The onus probandi fairly lies on the advocates of what is new, and only by the force of proof can they hope to secure the adoption of their views. Sometimes, perhaps, vigour of assertion, and a determination to compel assent, have been mistaken for this force of proof, and have provoked not altogether undeserved reprisals. We are told that a man of unusual breadth of view, and freedom from prejudice, and the trammels of merely traditional belief (Dr. Norman Macleod), after listening to some earnest advocacy of Evolution, suggested the following as a history of creation, which
might be accepted by the members of a certain learned Association:

1. The earth was without form, and void.
2. A meteor fell upon the earth.
3. The result was fish, fowl, and flesh.
4. Thence came the British Association.
5. And the British Association pronounced it all tolerably good.

It is more to the purpose, perhaps, to recall the pertinent suggestion of Dr. Temple, in his genial speech at Exeter, that differences of opinion on very serious points are in themselves sufficient reason, not for a greater separation, but for a closer intercourse between the disputants.

Mutual concession and mutual respect will be the outcome; and the truth, whether in older or newer fashion, will step forth with a beauty that will draw all after her.

Our Institution, ladies and gentlemen, offers, as we think, unusual facilities for the mutual interchange of feeling and opinion which is thus suggested to us. Established in 1812, it has now for the long period of sixty-five years been a source of pleasure and advantage such as few towns of the size of Plymouth have enjoyed. The hour spent in listening to the carefully-prepared paper, embodying the thought and conclusions of many months' study of some favourite subject, followed by a discussion often really able and discriminating, supplies to our members an opportunity of extending the range of their knowledge in Science, Literature, and Art, which is as pleasant in method as it is useful in results.

There seems no reason to think that the Session upon which we are now entering will fall short of any of its predecessors. The number of members and associates is quite equal, if not in excess, of former years. The conversazione, next week, will have more than usual interest by the exhibition of photographs of places visited and curiosities collected by an officer on board H.M.S. Challenger, which he has kindly placed at our service. The list of Lectures includes several papers of local interest, as well as those of a more general character, and it remains therefore only for each to do his part by attendance at the Lectures, and by sharing in the discussions which will arise upon them, to make this Session all that the founders and friends of the Plymouth Institution could hope for or desire.
Two years ago I had the honour of lecturing to the members of this Society on the "Geology of Plymouth" and the surrounding district. I have now to offer a few notes upon the local palæontology—the extinct natural history of the district, the records of which are embodied in our rocks, or entombed within our caverns. As the local geology of this, like other parts of Devon which lie within the limits of the commonly accepted Devonian system, opens up subjects of wide scientific controversy, which we cannot yet hope to settle conclusively; so the local palæontology embraces many points of special interest upon which we are not adequately informed, while it requires to be worked at considerably before we can regard it in anything like its full extent. Therefore although the known palæontology of Plymouth is rich and varied, I take it up now simply in a tentative spirit. Before we can be said to have had a full and complete review of the "Geology of Plymouth" it will be necessary that some remarks should be made upon the local petrology. This was a branch of the subject particularly handled by our late revered member Mr. John Prideaux, while another of the honoured fathers of this Society, the Rev. Richard Hennah, dealt specially with our palæontology. Petrology now, however, occupies a far different position to that which it did forty years ago; and upon some future occasion I hope to be enabled to offer some remarks on that topic also, and to make more complete the present cursory palæontological review.

Before I proceed, however, let me supply an accidental omission in my paper on the "Geology of Plymouth" by mentioning the existence of a small Triassic outlier between Cawsand and Picklecombe—a mass of conglomerate resembling the Triassic conglo-
merate of Torbay, with the felspathic trap noted by me immediately adjoining. My attention has likewise been called to the fact that Mr. J. C. Bellamy mentions the existence of submerged forests at Bovisand, Sandy Cove, and in the Laira. I may also add that Mr. Pengelly, F.R.S., is of opinion that the Dartmoor Granites are not, as he formerly held, of three periods, but of two—the common granites and the later elvans.

Let me remind you of the general facts stated in my former paper:—that the rocks of this locality are Middle Devonian; have a prevailing southerly dip; and that their order, read by the existing conditions of superposition, is: 1, slates; 2, limestone; 3, slates and sandstones; while trappean rocks, some contemporaneous and some intrusive, also occur, with occasional ash beds. The cleavage of the slates, as well as the bedding, partakes of the general southerly dip.

The northern slate rocks do not locally contain any fossils. Near Saltash, St. Stephens, and at other points between these places and Doublebois, they yield, however, as Dr. Holl has shown, Pleurodictyum problematicum, Fenestella antiqua, Cyathophyllidae, Atrypa desquamata, Bellerophon bisulcatus, Orthoceratites, Spiriferæ, and Phacops latifrons and punctatus. The absence of fossils in this immediate locality is therefore probably due to special local causes.

The Plymouth limestone is the main storehouse of the local paleontology. Originating clearly enough in what was once a fringing coral reef; in its origin and constitution it is essentially organic.

The rocks on the south of the limestone are of a more complicated character than those on the north. Taking the section on the east of the Sound, from Mount Batten onwards, it will be seen that slates, limestones, shales, grits, ash beds, and sandstones alternate with each other in very remarkable fashion, while faults and contortions by no means simplify the riddle. These rocks in part—the shales and limestones—are largely fossiliferous.

In the variety of their organic remains the Plymouth rocks are not so rich as some of the other limestone districts of South Devon—Wolborough and Barton for example; but the species that do occur are for the most part abundant. The leading peculiarity is, that while at the western end of the limestone (that is to say, at the Dockyard, Mount Wise, and in the quarry behind St. George’s Hall) mollusks of various kinds occur, at times in great profusion,
in its eastern portions (Cattedown, Oreston, &c.) they are comparatively rare, and over considerable areas altogether absent. And in like manner the branching corals are found chiefly in the western area. There does not appear to be any difficulty in accounting for these phenomena. Mollusks could only find a habitat on the exterior portions of the reef; and it is evident that the eastern section of the limestone, more particularly, has been subjected to a considerable amount of denudation, so that the outer beds have, to a large extent, been removed. Quarrying operations have had the same result, since the contents of the limestone were first investigated, in considerable portions of the western section. Another noteworthy fact, and one which attracted the attention of Mr. Hennah, is that bivalves and univalves are rarely associated, but keep to their own distinct areas, wherein they are found in such abundance that the rock is at times completely crowded with them. Many of the paving slabs in Plymouth streets bear testimony of this.

The limestone graduates into the slate on the south through calcareous shale, in which crinoidal remains abound.

The whole of the limestone beds south are more or less fossiliferous. Some of the shales, as at Staddiscombe, in lithological character and partially in contents, though their fauna is by comparison very meagre, resemble the rocks of South Petherwin.

The most abundant palæozoic fossils of the district include—Stromatopora polymorpha, Alveolites vermicularis, Acervularia pentagona, Cyathophyllum helianthoides, C. caespitosum, Cystiphyllum Damnoniense, Favorites Goldfussii, Smithia Hennahi, Actinocrinus tenuistratus, Fenestella antiqua, F. prisca, Retepora repisteria, Atrypa desquamata, A. reticularis, Merista plebeia, Orthis striatula, Rhynchonella cuboides, R. primiliparis, Spirifera simplex, Strigocephalus Burtini, Terebratula juvenis, Macrocheilus imbricatus, Murchisonia spinosa, &c.

The bones of the mammoth, hippopotamus, rhinoceros tichorinus, or leptorhinus, cave lion, cave hyæna, cave bear, ancient bear, the lesser bison, the long-fronted ox, the horse (fossil and plicated toothed), ass, various species of deer, wolf, fox, hog, and sheep, have occurred in the bone caves; and bones of a whale were found on the Hoe.

The annexed list is offered, not as being exhaustive, but as being as nearly complete as circumstances have permitted, and as indi-
cating some of the leading localities in which the fossils enumerated occur. Examples of the whole, with a few exceptions, will be found in the Museum of the Institution.

PLANTÆ.

Professor Phillips records the occurrence of an alga at Bovisand; and there are thin carbonaceous films in the calcareous shale at Mount Batten, which appear to bear traces of a similar origin. At the meeting of the British Association at Plymouth in 1841, Mr. J. P. Pratt exhibited specimens from blocks on the beach at Mount Batten, which were stated to contain “several species of plants.” I know of no such remains from that locality which have been identified.

ANIMALIA.

AMORPHOZOA.

Scyphia turbinata
Stromatopora concentrica . . Cattedown, Whitsand.
Stromatopora placenta . . Cattedown.
Stromatopora polymorpha . . St. George’s Hall, Millbay, Teat’s Hill, Prince Rock, Whitsand, Oreston, Yealmpton.
Stromatopora ramosa . . Cattedown, Brixton.

CELENTERATA.

Acervularia Goldfussi . . Cattedown.
Acervularia intercellosa . . Cattedown.
Acervularia pentagona . . Cattedown.
Alveolites vermicularis . . Mount Wise, Devil’s Point, Millbay, St. George’s Hall, Cattedown.
Amplexus tortuosus . . Mount Wise. (?)
Cyathophyllum coepitosum . . Bovisand.
Cyathophyllum helianthoides . . Mount Wise, Devil’s Point, Yealmpton, Cann Quarry (Bellamy).
Cystiphylum Damnoniense . . Mount Wise, Cattedown.
Cystiphylum vesiculosum . . Mount Wise, Cattedown.
Favosites Goldfussi . . Devil’s Point.
Favosites cervicornis . . Cattedown.
Favosites fibrosa . . Cattedown.
Heliolites porosa . . Cattedown.
Pleurodicyum problematicum . . Cann Quay, Yealmpton, Goosewell, Elburton, Whitsand, Cattedown.
Petraia pleuriradialis . . Elburton.
Petraia Celtica . . Cattedown, Mount Batten, Bovisand, Plympton, Plymstock, Yealmpton, Brixton.
Smithia Hennahii . Cattedown, Yealmpton.
Spongiophyllum Sedgwickii .

ECHINODERMATA.

Actinocrinus tenuistratus . Brixton, Staddiscombe, &c.
Hexacrinus interscapularis .
Platycrinus pentangularis .
Cyathocrinus megastylus . Bovisand.

Fragments of encrinital stems and joints are among the most abundant of the local fossils; but the heads are very rare. Crinoidal remains are particularly abundant in the calcareous shale along the southern edge of the limestone, from the Dockyard to Prince Rock; and at Mount Edgcumbe, Mount Batten, Bovisand, Staddiscombe, Yealmpton.

CRUSTACEA.

Fragments of trilobites have occurred at Mount Wise, and elsewhere. One of the best specimens discovered was found among some rubbish removed from the site of the present Guildhall at Plymouth. Trilobites have been found in slate at Yealmpton.

Phacops latifrons . Yealmpton.
Phacops punctatus .

POLYZOA.

Fenestella antiqua . Mount Wise, Cattedown, Yealmpton, &c.

Very common; frequently associated with the crinoids in calcareous shale.

Fenestella prisca . Cattedown.
Ptylopora flustriformis . Cattedown.
Retepora repisteria .

BRACHIOPODA.

Atrypa desquamata . Mount Wise.
Atrypa reticularis . Mutton Cove, Mount Wise, Millbay.
Atrypa aspera . Dockyard.
Cyrtina heteroclita . Mount Wise.
Leptaena interstrialis .
Orthis arcuata . Mutton Cove.
Orthis striatula . St. George’s Hall, Staddiscombe.
Pentamerus brevirostris . St. George’s Hall.
Productus subaculeatus .
Rhynchonella cuboides . Mutton Cove, Mount Wise, St. George’s Hall.
Rhynchonella primiliparis . Dockyard, Mount Wise.
Rhynchonella protracta . St. George's Hall.
Rhynchonella pugna . Mount Wise.
Rhynchonella triloba . Mutton Cove.
Rhynchonella reniformis .
Rhynchonella implexa .
Rotzia ferita . Dockyard.
Spiriferida curvata . Staddiscombe.
Spiriferida nuda . Dockyard.
Spiriferida simplex . Staddiscombe.
Strigocephalus Burtini . Mount Wise, St. George's Hall.
Streptorhyncus crenistria.
Strophonema rhomboidalis .
Terebratula saccularis . Mount Wise.
Terebratula juvenis . Mount Wise.

LAMELLIBRANCHIATA.
Conocardium aliforme (?) . Mount Wise.
Corbula Henahii .
Pterinea texturata . Millbay.

GASTEROPoda.
Acroculia vetusta (?) . Mount Wise.
Euomphalus radiatus . St. George's Hall.
Loxomema Henahiana .
Loxomema preterita .
Macrocheilus imbricatus . St. George's Hall.
Macrocheilus harpula .
Murchisonia spinosa . St. George's Hall, Bovisand.
Pleurotomaria aspera . Elburton.
Turbo cirriformis .

NUCLEOBRANCHIATA.
Bellerophon striatus . Mount Wise.

CEPHALOPODA.
Orthoceras cinctum, or undulatum (?) Mount Wise, St. George's Hall.

PISCES.
The interesting Pteraspide, concerning the character of which there has been so much controversy, and which were long held to be sponges, have been found so near Plymouth as the Rame Head. "Scales of fish," from blocks lying on the beach at Mount Batten, were exhibited at the meeting of the British Association in 1841. Fish-scales have likewise been found at Plymstock. When first discovered at the Whitsands, the Pteraspide were deemed fucoids, and were lost sight of until Mr. Pengelly found them at Rame.

Mr. Bellamy states that a fossil fish was found in the rocks (?) slate) of Jennycliff Bay.
MAMMALIA.

Elephas primigenius . . . . Hoe, Yealmpton, Oreston.
Felis spelaea . . . . Oreston.
Hyaena spelaea . . . Oreston, Yealmpton, Hoe.
Ursus priscus . . . . Oreston.
Rhinoceros tichorinus (Owen), leptorhinus (Busk) . . . . Hoe, Yealmpton, Oreston.
Hippopotamus . . . . Said by Mr. Bellamy to have occurred at Oreston, Yealmpton.

Bison minor . . . . Oreston.
Bos longifrons . . . Oreston, Yealmpton, Hoe.
Equus fossilis . . . Oreston, Yealmpton, Hoe.
Equus plicidens . . . Oreston (?), Yealmpton.
Asinus fossilis . . . . Oreston.
Glutton . . . . Yealmpton.
Canis lupus . . . Oreston, Yealmpton.
Vulpes vulgaris . . . Oreston, Yealmpton.
Sus . . . Oreston, Yealmpton.
Cervus . . . Yealmpton.
Ovis . . . . Hoe, Yealmpton.
Cetacea . . . . Hoe.
SOME REMARKS ON THE HEDGE-ROWS OF THE NEIGHBOURHOOD OF PLYMOUTH.

PART I.

BY MR. T. R. A. BRIGGS, F.L.S.

(Read October 25th, 1877.)

One of the aims of our Society is the investigation of subjects of a local character. Bearing this in mind I have put together a few particulars on some of the hedge-row bushes of our neighbourhood.

A marked feature in the appearance of the country about Plymouth is due to the division of the surface into many small fields, by broad, and sometimes high, intersecting earthen banks, crowned with a thick growth of copse-like wood. In the locality these mounds are sometimes called hedges, though such a term should rather be limited to the woody fringe-like growth above. By calling the mounds hedge-banks, and the lines of bushes hedge-rows, we get a suitable term for each, and all confusion between the two is avoided.

It is certain that many existing hedge-banks and hedge-rows were formed hundreds of years ago, from the references made to them in old title deeds of estates. In quite early times, or at least so soon as individual rights to land came to be established and acknowledged, it must have been found convenient to mark out in some way or other the holdings of different proprietors, for which purpose we cannot doubt that mounds of earth and stones would be frequently employed. These would also serve to shelter cattle and prevent their straying. For further security the addition of a fringe of bushes on top of the mounds might readily be made, formed at first perhaps of limbs of trees or branches, fixed or stuck along the ridge, the accidental rooting of some of which might suggest the subsequent formation of entire hedge-rows of living bushes. In connection with some particulars to be gone into presently, it is important for us to consider how a primitive workman would set about making such a hedge-row. After he had
collected the requisite quantity of earth and stones, and piled up these materials into the rude hedge-bank, where would he obtain the bushes to complete the work? Should the newly enclosed land have any suitable ones scattered over it, which in many spots would certainly be the case, I think he would be sure to root up these and use them, as by so doing he would be ridding the land of an encumbrance whilst supplying his want. Sometimes an adjacent copse might furnish all that he required. In either case the transplanted bushes would of course continue to rank among species indigenous to the locality, though from being removed to the hedge-row they would henceforth have to be considered as in an artificial habitat. However, in certain tracts, elevated ones especially, the adjacent ground would be likely to be destitute of any suitable bushes; so here the workman would have to obtain them elsewhere. Yet in early times it is probable that even when so circumstanced he would get only those belonging to truly indigenous species. In later days, after arboriculture and horticulture had made some progress, it might be different; for we can imagine him then resorting to a neighbouring garden to take from it any suckers or self-sown seedlings of Plum, Pear, or Apple, or else going to some plantation near at hand to bring back a few young Beech or Elm, to complete his work. This might occur ages before there were nurserymen to rear bushes for hedge-row making. Whilst speaking of man's work in this direction we must not lose sight of the fact that he has not been the only operator; for often entire hedge-rows are of nature's planting. On the brow of a bank, or at the sides of an old sunken lane, they frequently are so; remnants of once extensive aboriginal copses, gradually uprooted as agriculture progressed, until only the narrow strips remained, left simply to form a fence by the lane or above the bank, as the case might be.

In judging of the indigenous character or otherwise of hedge-row growth we must also bear in mind that we often see truly native bushes rising up through a planted hedge of thorn or other species; their occurrence in such a position being due to the action of winds, or the agency of birds or other small animals. All things considered it is often no easy task to assign a hedge-row bush its true position as Native, Denizen, or Alien. Much discernment and nice observation are required before deductions on the subject can be of any value.

For purposes of botanical investigation I have divided the tract
of country within a radius of twelve miles of Plymouth into six
districts, founded on the River Drainage, and it is to the hedge-row
bushes of this area that the remarks in this paper have reference.
The commonest of the decidedly indigenous ones are: *Prunus*
spinosa (Sloe); *Crataegus Oxyacantha* (Hawthorn); *Fraxinus ex-
celsior* (Ash); *Quercus Robur* (Oak); *Corylus Avellana* (Hazel); and
two *Salices*, *S. cinerea* (Common Sallow) and *S. caprea* (Goat Sallow).
As next in abundance I place *Ilex Aquifolium* (Holly); *Eunonymus eu-
ropaëus* (Spindle Tree); *Pyrus acerba* (Crab); *Cornus sanguinea* (Wild Cornelian); *Sambucus nigra* (Elder); *Alnus glutinosa*
(Alder); and *Betula alba* (Birch); though of these the Alder, from
affecting damp spots, and the Birch, the wilder and hilly ones,
having more of a local character than the others; whilst the Cornelian,
so far as its occurrence in the calcareous districts is concerned,
might rank with the commonest. Probably *Prunus insititia* (Bul-
lace) is also best placed in this second list; likewise *Prunus Avium*
(Black Cherry), though this last is a somewhat doubtful native.
In a third list I put *Rhamnus Frangula* (Alder Buckthorn); *Pyrus Aucuparia* (Mountain Ash); *Viburnum Opulus* (Water Elder); *Ligustrum vulgare* (Privet); and *Salix aurita* (Eared Sallow).
In a fourth list are the quite local *Acer campestre* (Maple); the
very sparsely found *Pyrus terminalis* (Wild Service Tree); and
*Populus tremula* (Aspen). In a fifth list, as very rare and extremely
local shrubs, I put *Pyrus latifolia* (Broad-leaved Service) and
*Viburnum Lantana* (Wayfaring Tree). This completes the catalogue
of our indigenous species.

Among the Denizens I place *Acer Pseudo-platanus* (Greater
Maple or Sycamore) and *Fagus sylvatica* (Beech). Both are now
very common, and reproduce their species abundantly from self-
seeded seeds. Historical evidence seems to prove the Sycamore an
undoubted introduction; for old Gerarde in his quaint and in-
teresting *Herbal*, published in the reign of Elizabeth, says, “The
Great Maple is a stranger in England, only it groweth in the
walkes and places of pleasure of noblemen, where it especially is
planted for the shadow sake, and under the name of Sycomore
tree.” Whatever position the Beech may hold in some parts of
Southern England, I think there can be little doubt as to its
belonging to the Denizen class in this neighbourhood. Here I also
place *Prunus domestica* (Wild Plum); *P. Cerasus* (Morella Cherry);
*Mespilus germanica* (Wild Medlar); *Pyrus communis* (Wild Pear);
the two Elms, *Ulmus suberosa* and *Ulmus montana*; *Carpinus Betulus* (Hornbeam); and six Willows, *Salix fragilis*, *S. alba*, *S. triandra*, *S. viminalis*, *S. Smithiana*, and *S. ferruginea*. It is quite possible some of these willows may be indigenous.

The Aliens, *Tilia intermedia* (Lime) and *Castanea vesca* (Chestnut) complete our catalogue.

Probably the Hazel is the most abundant and general of all our hedge-row bushes, though in certain spots we find the Oak predominating, and in some places the Common Elm is very plentiful, though a decidedly local species as regards the whole area. The Ash occurs in well-nigh all our hedges, though it does not often form long continuous lines in them like the Hazel, and sometimes the Oak, being rather dotted in amongst the other things. The Sycamore is principally met with at no great distance from houses. In damp spots the Common Sallow generally appears, intermixed perhaps with Alder. The above, with some Hawthorn, Sloe, and Wild Cornel, are the chief constituents of our hedge-rows.

I now proceed to make some remarks on a few of the species enumerated in my lists, dealing to-night with those belonging to the order *Rosaceae*, several of which are of peculiar interest from the connection between them and our cultivated Plums, Cherries, Pears, or Apples. These all belong either to the genus *Prunus* or *Pyrus*. Under the former we find three bushes that all come under the aggregate *P. communis* of Hudson, but appear in the *London Catalogue*, and in my lists, as *P. spinosa*, *P. insititia*, and *P. domestica*; in other words, the Sloe, Bullace, and Wild Plum. Concerning them there is abundant room for critical remarks; for whilst some leading botanists regard the three as distinct species, several consider them varieties of but one variable species, and others adopt an intermediate course by applying to them the term sub-species. Let us see how they are dealt with in some of the best known works on British botany. Watson, in the *London Catalogue of British Plants*, ed. 7, and Smith, in *English Flora*, have alike sp. 1, *spinosa*; sp. 2, *insititia*; sp. 3, *domestica*. Dr. Boswell, in *English Botany*, ed. 3, and Sir Jos. Hooker, in *Students' Flora*, sub-sp. 1, *spinosa*; sub-sp. 2, *insititia*; sub-sp. 3, *domestica*. Babington, in *Manual of British Botany*, has *Prunus communis*: variety 1, *spinosa*; var. 2, *insititia*; var. 3 *domestica*. Bentham, in *British Flora*, has 1 species, *P. communis*, adding some remarks on its varieties.
With these differences among such authorities, anything like a definite conclusion as to the true character of the three shrubs seems hopeless; still the investigation of the matter is of great interest from the bearing it has on the "origin of species" question. The term sub-species, adopted by two of the authors quoted, was employed by Von Mons under its French rendering years before the appearance of Darwin's celebrated work; yet the use of it, so far at least as Sir Jos. Hooker is concerned, may be held to imply an acquiescence in Darwin's views. Mixed up with this "species versus variety" question, there is the one relative to the position of insititia and domestica—the Bullace and Plum—as indigenous shrubs or otherwise. All acknowledge spinosa, the common Sloe of our hedges, to be indigenous; and those who consider the other two to have sprung from it, whether into varieties, sub-species, or even a higher grade, must regard it as the typical or oldest form of the plant. Now as to the Bullace. Here we must be careful to ascertain exactly what we include under the name before proceeding further, for I suspect that forms considerably diverse pass under it among British botanists. One of these differs but little from the Sloe, except in being manifestly larger in leaves, flowers, and fruits, and having the leaves permanently hairy beneath. This is, I believe, the Prunus fruticans of Weihe. I have received a specimen from the Rev. Augustin Ley, collected at Fawley, Herefordshire, labelled "insititia," on Mr. Baker's authority; and many, of what I take to be the same form, likewise named "insititia," collected by Mr. Foggitt, in Yorkshire, recently passed through my hands, as Curator of the Botanical Exchange Club. Under these circumstances, I conclude that some British botanists apply to fruticans the name insititia. Fruticans is common about Plymouth, and unquestionably indigenous; so at least to the extent that this name is synonymous with that of insititia must the latter be considered indigenous here. Thus we have Prunus spinosa, indigenous; P. fruticans, that is, P. insititia, Anglor. ex parte, indigenous; P. domestica, alien or denizen.

Although these plants are such a puzzle to modern botanists, they seem to have given old Gerarde no trouble in the days of "Good Queen Bess;" for this is what he says about them: "The Bullesse and the Sloe tree are wilde kindes of Plums, which do vary in their kind, even as the greater and manured Plums do. Of the Bullesse some are greater and of better taste than others.

P 2
Sloes are some of one taste and some of others, more sharp; some greater and others lesser; the which to distinguish with long descriptions were to small purpose, considering they be all and every of them knowne even unto the simplest."

Having done with the wild Plums of our hedge-rows, I will say a little about the wild Cherries, *Prunus Avium* and *P. Cerasus*. I shall only deal with the question of their aboriginal nativity or introduction, for to me their specific distinctness appears undoubted, differing to the extent they do in general habit, leaves, flowers, and fruit. However, there are botanists who combine the two, and Hooker, in his *Students' Flora*, makes them but sub-species. We have *Avium* as a tree of moderate size in many of our woods, as well as in our hedge-rows, but I have never seen *Cerasus* in a copse or wood, and usually in such hedge-rows as are in the vicinity of houses. I consider *Avium* (that is, the Black Cherry or Gean) a doubtful native; *Cerasus* (the Morella) not more than a denizen.

I may here incidentally remark that there is a strange error in Hooker's *Students' Flora*, through the statement that the Dwarf Cherry is the supposed origin of the Garden Cherry, and the Gean of the Morella. The converse is the case. The Morella fruits but sparingly in our hedge-rows, owing probably in some measure to the bushes being generally cut back after having attained only a few years' growth. Still, considering the quantity of it, the avidity with which birds devour its fruits, and the extreme readiness with which Cherries spring from seed, it does seem remarkable that I am unable to bring forward a single instance of its occurrence out of a hedge-row. Under these circumstances I put it, without hesitation, in the denizen list.

I will now give some particulars concerning our wild Pears. Turning to the *London Catalogue*, we see three varieties named under the *Pyrus communis* of Linnaeus. They are *Pyraster*, *Achras*, and *Briggsii*. We find much the same confusion here as we do concerning the wild Plums, some authors considering the three plants as of a higher grade than varieties of a single species. In the neighbourhood of Plymouth the wild Pear is quite rare, though we have two of the varieties named under it, viz., *Pyraster* and *Briggsii*; possibly *Achras* also, but unfortunately the discrimination of it and *Pyraster* depends greatly on the relative size and shape of the fruits, and these are so sparingly produced by our hedge-row examples that I have seen it in but very few instances.
Remembering that a pear tree growing near Antony produced some flowers last spring, I went recently to look for fruit. On arriving at the spot I was vexed to find none on it, though the broken state of its branches and the condition of the hedge-bank below told a tale, namely, that others besides botanists have a taste for wild pears; the rough way in which they had been gathered leading to the conclusion that they had been taken for some other purpose than to afford diagnosis between Pyraster and Achras. The chance of yet finding a fallen fruit led me to search amongst the surrounding herbage, but here a field mouse had forestalled me, though the rodent, more considerate for science than the biped pear-devourer, had left me nearly the half of a fruit, just sufficient to enable me to ascertain its size, and also to show the tree producing it to be Pyraster rather than Achras. The fruit was 1 1/12 inch in length, by 1 4/12 inch in breadth; of a size greatly in excess of its ally Briggsii, the Pear I next have to speak of. This peculiar Pear I discovered several years ago in a hedge in the parish of Egg Buckland, where there are many bushes of it. I sent specimens to the Botanical Exchange Club, from which Dr. Boswell (then Mr. Boswell-Syme) drew up a description of the plant for the Report of the Society for 1871, giving it at the same time the provisional name of Briggsii. To this I subsequently added particulars in the Journal of Botany, with reference to some of the striking characteristics of the plant.

I will now give some particulars as to Dr. Phené's conjectures concerning this Pear. Though aware when I wrote mine of the botanical interest attaching to the plant, I certainly did not expect this little Pear would subsequently be brought forward by a distinguished archaeologist to support some ingenious speculations of his own. That it should be considered an interpreter of an old legend connected with our great western hero, King Arthur, and, moreover, that its distribution should be held to indicate the migrations of an ancient people, would have then seemed almost beyond the verge of possibility. That such has now been the case proves how the student of a certain science may sometimes, quite unconsciously to himself, help forward the work of another whose investigations seem to lie in quite a different direction.

In the Gardener's Chronicle for November 27th, 1875, a reference to it appeared, and in the Journal of Botany for August, 1876, Dr. Maxwell Masters, the editor of the Gardener's Chronicle, em-
bodied many particulars concerning it in an article "On certain small-fruited Pears." From this I extract the following: "My own attention was drawn to this form from the circumstance that the eminent archeologist, Dr. Phené, sought my assistance in the determination of a small-fruited Pyrus which he had found in Brittany. This I had no difficulty in identifying with the Pyrus cordata of Desveaux. According to Decaisne, the form just mentioned, which is found in Anjou and Brittany, is the same with a species found in North-east Persia, on Mount Elbraz, by Buhse, and elsewhere in the same region by other collectors. The Persian form was originally called Boissieriana by Buhse, but it is described under the name P. cordata, Desv., in Boissier’s Flora Orientalis." In proceeding with his article, Dr. Masters refers to the previous one in the Gardener’s Chronicle, from which he cites the following passages, embodying the views of Dr. Phené concerning these Pears: "Dr. Phené visited Brittany to trace practically any connection, if such could be found, between the legends which connect the ‘Isle of Apples’ of Arthurian repute with that locality, and those which connect it with Britain. King Arthur, it appears, is supposed to have been buried either in the Island of Avalon (Glastonbury), in England, or in that of Aiguillon, in Armorica, the equivalent of Isle of Avalon being Isle of Apples. An island in Loch Awe, in Argyllshire, has a Celtic legend containing the principal features of Arthurian story, but in this case the word is ‘berries’ instead of apples. These particulars were fully given in a paper, read on June 10th, 1875, by Dr. Phené before the Royal Historical Society, in which he expressed a belief that the legend of the mystical Arthur was derived from the character of Arjuna, given in the Indian poem, ‘Máhá Báráta.’ After closely examining the island in Loch Awe, and Avalon in Somersetshire, he concluded his researches by a visit to Armorica, Brittany. He there observed a tree which helped him to the apples of Avalon and the berries of Loch Awe, for the apples on the tree were berries. The specimen he has submitted to us is the Pyrus cordata of Desveaux, and it is interesting to note, in support of Dr. Phené’s argument, that it has been found in Western France—perhaps in South-western England, if the plant found by Mr. Briggs, near Plymouth, and called by Dr. Boswell-Syme Pyrus communis var. Briggsii, be the same—and nowhere else in Europe. Both countries had their shores occupied, anterior to the invasion
of the Cymry, by a peculiar race of people having strong Oriental characteristics, and which people some authors describe as occupying the country as far north as Argyllshire—the evidences of such occupation having been laid before the British Association in September, 1875, in Dr. Phené's paper on that subject—while the same tree is found on Mount Elbuz in North-east Persia" (this statement, from further evidence, is very questionable), "a country not remote from that which formed the arena of Arjuna's exploits, and whence it would seem to have been imported to the west of Europe."

A subsequent article, entitled "Further Notes on Small-fruited Pears," by Dr. Masters, appeared in the Journal of Botany for October, 1876. He says, "Since I wrote concerning certain small-fruited Pears in the August number of the Journal, two additional communications have reached me on the subject. One may be deemed wholly satisfactory; the other is so far satisfactory that it may serve the interests of truth by throwing a doubt upon the Persian origin of the forms in question. Of course in so doing the romantic history narrated on the authority of Dr. Phené is partially, but only partially, impugned." He adds, "It may suffice to repeat here that there is very good reason for asserting that the Pyrus communis, var. Briggsii, of Syme, which was found near Plymouth by Mr. Briggs, as formerly detailed, is the same form as that found in some parts of Anjou, Brittany, and the Gironde, and which is known to French botanists as P. cordata, Desveaux. There is also a Persian form, called by Buhse P. Boissieriana, referred by no less an authority than M. Decaisne to P. cordata, Desveaux. Such were the facts, leaving aside the inferences founded on them, as known to me when I last wrote." Dr. Masters continues, "Shortly afterwards Mr. Briggs was kind enough to forward for my inspection several specimens of what he thinks is the same form as that he originally met with. As these specimens are from barren shoots without flowers or fruits, it is, of course, not absolutely certain that they belong to the same form, though the similarity of foliage is so great that it seems in the highest degree probable that they do. These recently found bushes grow by an ancient lane above the coast between Seaton and Looe, East Cornwall, eleven or twelve miles from Egg Buckland (the original locality); and there seems to be good reason for considering the shrub indigenous at this new spot. One bush is very old and rather stunted, having been rendered the more scrubby from having had the branches cut off on
the lane side of the hedge at different times. The other example of the Pear,' (I may now add I have since found a third in the locality,) comparatively a young one, grows about one-eighth of a mile from the one just mentioned; on the other side of the lane, and not in the hedge-row but on the side of the hedge-bank, only a little above the level of the lane; hence in a spot where we may reasonably conclude that it sprang from seed, especially as I could find none of it in the hedge-row above.'" With reference to the preceding paragraph Dr. Masters continues, "In these terms Mr. Briggs writes to me, and on comparing the specimens with which he has now favoured me with those formerly distributed by him, and with the Brittany specimens referred to in my previous communication, I can but come to the conclusion that, so far as the evidence before us justifies an opinion, they all belong to one and the same form. The second communication to which I referred consisted in the transmission of the type specimen of Pyrus Boissieriana, Buhse, n. 1046a. For this I am indebted to the great kindness of M. Boissier. On comparing this with the French and with the Devonshire and Cornwall specimens, I can but conclude that as species and varieties go nowadays, the Persian plant is quite distinct from the others." Dr. Masters adds, "It now remains to see how Dr. Phéné's fascinating speculations are affected by these facts. First, as the identity of the Western French specimens and those of South-western England is rather confirmed than otherwise, so the Arthurian origin of the small-fruited Pear in Cornwall is strengthened proportionately. But as to the Persian origin of these forms the evidence is decidedly weakened, though it is still quite within the bounds of possibility that the plant has migrated from Persia, and that the existing differences are referable to climatal variations extending over centuries."

To the above particulars from Dr. Masters I will add but little. I am however pleased at being able to say that I have reason to think a pear-tree in a hedge near Tregantle, and so at a third station, is of a similar kind. In the autumn of 1875 I obtained a few seeds from fruits of the Egg Buckland shrub, three of which produced plants, the largest now nearly two feet high, which I am going to send to Kew, in order that it may be planted in the Arboretum there.

I proceed to say something about the Apples of our hedge-rows. As to their classification, we find much the same difficulty as we
do concerning our Plums and Pears, though in a less degree; for we have only two strongly marked forms to deal with—*Pyrus acerba*, the Crab, and *Pyrus mitis*, the Wild Apple. They are designated *sub-species* by Dr. Boswell, though, in common with most British botanists, I would rather sink them to the grade of *varieties* under *Pyrus malus*, as I have occasionally found plants with intermediate characters. Their chief differences are well noted by Watson in the following words: “The true, or austere Crab” (*acerba*) “has nearly glabrous leaves, with small, very sour fruit on slender pedicels. The wilding Apple” (*mitis*) “has the underside of the leaves and other surfaces clothed with cottony pubescence; its fruit is usually larger and less sour, and on a shorter and thicker stalk.” He adds: “This latter is the more frequent variety, or rather series of varieties, filling up the interval between the sour Crab and the garden Apples; and no doubt it is often produced directly from the latter, if not always so.” Some have spoken with hesitation as to the indigenous character of the Crab (*acerba*) in England; but I feel confident of its being a true native in the neighbourhood of Plymouth, occurring as it does in aboriginal woods and wild copses, as well as in hedge-rows. Moreover, I am half inclined to regard *mitis*, from its distribution, as a native also, though, on the other hand, quite willing to accept the view that many of our examples of it are but the produce of seeds of cultivated Apples. Dr. Boswell, in *English Botany*, says of it: “No doubt the original stock of all the cultivated Apples which have shortly-stalked fruits;” the correctness of which opinion I would not question, though it is only by considering the plant an introduction that we can quite reconcile this view with another statement of his concerning it; viz., that it is “most probably generally, if not always, derived from the seeds of the cultivated Apple.” He speaks only as to what he considers the parent form of our Apples with short-stalked fruit, saying nothing as to that of the others. To me it seems highly probable that such of them as produce round fruits, borne on long slender stems, have sprung directly from *Acerba*, rather than from it through *Mitis*.

Our other hedge-row bushes belonging to the genus *Pyrus* are three—*P. torminalis*, the Wild Service; *P. latifolia*, Broad-leaved Service; and *P. Aucuparia*, Mountain Ash. *Pyrus torminalis* is rare, though thinly scattered over the whole of the wooded and enclosed portions of our area, occurring in copses and woods as
well as in hedge-rows; in favourable situations attaining the dimensions of a tree. It has handsome coriaceous leaves, somewhat of the shape of those of the Maple, though larger, and when these are associated with corymbs of Mountain Ash-like flowers the shrub has an elegant appearance. Unfortunately however it only flowers when the bushes have become of a size and age they are now rarely or never suffered to attain in our hedge-rows, through the frequent cutting and paring processes of modern systems of farming. Sometimes it meets with no better treatment in our woods, from being cut down indiscriminately with the coppice-oak. Of those who notice our wild flowers but few have seen this Service Tree in bloom. The finest example I know grows near the heronry in Warleigh Wood. This, by a rough calculation that I made a few years ago, was then between thirty and forty feet high, with a bole clear of branches for about six feet from the ground, and a few inches from the surface four feet in circumference. The members of one of our northern Natural History Societies have recently turned their attention to the delineation and description of the remarkable trees of their part of the country, and should a similar work ever be undertaken by our own, this Warleigh Pyrus torminalis would be well worth figuring. In some parts of southern England this species would seem to be commoner than with us. Dr. Bromfield, in his Flora Vectensis, speaks of its fruit being sold in both Sussex and the Isle of Wight "in the shops and public markets, tied up in bunches, principally to children." He adds: "At Ryde they go under the name of Sorbus berries, but are not in much request, a fact by no means surprising when we consider the twofold interpretation implied in the specific name—by some alleged to bear reference to the efficacy of these berries in cases of dysentery; by others, with whom, like Withering, we are from experience compelled to coincide, pronounced highly befitting a fruit qualified to cause rather than cure the disease in question." Pyrus latifolia (Broad-leaved Service) is extremely rare. It is the P. scandica of Babington's Manual. It was unknown in a wild state about Plymouth until I discovered it several years ago in the neighbourhood of Roborough, since which I have met with it in two or three spots near Meavy. It is even handsomer than torminalis, and its beauty seems to have met with some appreciation, for we occasionally find it admitted into pleasure grounds, together with some allied forms. I have
however found the smell of its flowers to be so disagreeable that I cannot but think some would object to its introduction near their dwellings. Fruit is occasionally produced on the wild plant. Some that I examined a few years ago was nearly globose in shape; the largest examples a little over half-an-inch each way. When fully grown, but stone-hard, the colour was olivaceous brown, with numerous very small light-brown or greyish dots disposed irregularly over the surface, giving the skin a blistered appearance. When ripe, at the end of October or in November, it becomes somewhat reddish in colour, but is never of the decided red of the berries of the allied P. eu-Aria. Beyond "fruit red," copied into Babington's Manual, I can find no description of that of latifolia, apart from that of Aria, in any of our British Floras, hence a reason for the insertion of the preceding particulars. The use made of the fruit of an allied species, said to be Pyrus domestica, originated the English name of these plants. This was employed for making a fermented liquor, a kind of beer, called in Latin Cervisia, which word became corrupted into "Service."

One of the best known species of the genus is the graceful and elegant Mountain Ash (P. Aucuparia). Many who have never seen it overhanging the mountain stream, or mingling in the scanty coppice growth that here and there forms a slight fringe around the base of some Dartmoor hill, may have noticed its glowing berries as one of the chief ornaments of some villa entrance, or pretentious cottage residence, on the outskirts of our town, where its flexible young branches are sometimes interlaced to form a living archway above the garden gate. Pity it is thus to confine graceful boughs formed to wave with such elegance in the breeze. As a hedge-row bush it is local in our area, being rather common in the wilder and hilly tracts, but far from common in the flatter portions of the country, and the vicinity of the coast. The fruit is so greedily devoured by birds of the thrush kind, that it does not deck the bushes for any considerable time. One of our most characteristic Dartmoor birds, the Ring Ouzel (Turdus torquatus), helps to clear them before it leaves in the autumn.

Having now spoken of all our hedge-row bushes coming under Pyrus, I will bring my little paper to an end. I may perhaps be able to say something at a future time on the rest of our hedge-row bushes, if I have not exhausted the patience of the members of our Society by the details now given.
The ear is more analogous in ultimate structure to the eye than any other organ of the human body. It is firmly encased in the hardest portion of the temporal bone, to keep it away from external disturbing shocks. It is not like the eye, so regularly arranged; but this is due to its having sound-waves instead of light to deal with. The membrana tympanum is the vibrating drumhead which receives the shocks. They are then transmitted by a chain of bones (the malleus, incus, and stapes) to the fenestra ovalis. The joint of the stapes here is elaborate, and capable of high range of movement. The bones and two membranes are moved by small muscles. The most interesting motion is the rendering tense the membrane of the fenestra ovalis, by fastening in the stapes. Inside this orifice is placed the labyrinth. It consists of a chamber, the utriculus, with appendages; the cochlea—semicircular canals, ampulla, saccus, macula accoustica, &c. These are chiefly covered with epithelium, in which the various filaments of the auditory nerve have appropriate endings. The cochlea is a most intricate piece of machinery, containing the most elaborate organs. It has two canals, the scala tympani and vestibuli. The latter has within it, and only divided from it by the membrane of Reisner, the ductus cochlearis. This contains the membrana tectoria and the organ of Corti. This latter has fibres, which being joined together at the capitura, form a tunnel. Over this is spread out the membrana reticularis, which has entangled in it the brushes of auditory hairs belonging to the six cells arranged over the membrana basilaris. These hair cells in their action are the analogues of the rods and cones of the bacillary layer of the retina, multipliers of molecular disturbance. Roughly speaking, the functions of the various parts are supposed to be as follows: The tympanum for intensity, the cochlea for pitch, and the semicircular canals for direction. The whole is very complex, rendering verifying experiments exceedingly tedious and difficult.
As we look upon our modern civilization, and note in detail the varied elements entering into its puzzling complexity, the question naturally arises whether we can get a simple classification of the inter-blended forces; and if so, whether we can trace each class back to its original source. Leaving out of consideration altogether the activities embodied in commercial life, it may not be far from the truth if we arrange the other elements of our life under the terms Religion and Morals, Law and Civil Order, Science and Art. The native energy through which these find expression, is, in the main, British, though, as they exist amongst us, these elements are manifestly of foreign origin. It is scarcely to be expected that every nation can be original with respect to the leading lines along which human nature manifests its intellectual and moral powers; and, therefore, there is no necessary derogation of our good fame in the supposition, that we have derived from external sources the principal features of the modern order in which we take such justifiable pride. The conflux in us of the blood of Briton, Scot, Dane, Saxon, Norman, has had the effect of creating a highly varied receptivity of nature, by which the characteristics of civilization derived from other peoples assume a freshness and completeness not to be found in nations sprung from a single stock.

It would require very extensive knowledge in all departments of literature, and the skill of a master hand, to trace back, with any degree of precision, our ideas, institutions, and achievements to their fountain-head, distinguishing in the meanwhile the developments that are to be ascribed to our own national peculiarities. The purpose we have in hand just now may be subserved if, in this respect, we simply note the broad historical fact, which has been insisted on of late years, that, speaking in general terms, we owe
our Religion and Morals to Judea, our Law and Civil Order to Rome, and our Science and Art to Greece. Our immediate concern is with the Greek.

Although in a general survey of our modern life it may suffice, for a broad outline, to speak of Greek influence as supreme in Science and Art, it by no means follows that it is limited to the mental activities specifically denoted by these terms. By means of a remarkable literature, studied with almost passionate ardour by the ablest men of every age, the Greek mind has contributed to a high degree of mental activity; has furnished a rich variety of ideas on many subjects; and has, to a considerable degree, imparted its own characteristics of clearness, precision, and severe truth, to natures inferior in these respects to itself. The higher formative powers of Latin literature are primarily due to antecedent Greek culture. No sufficiently strong force has arisen, either within the British or German mind, to neutralize the directive and formative power of the Greek; nor is there a probability of such a contingency arising, inasmuch as the development of the Greek mind was intensely accordant with nature, and, therefore, permanent in its influence.

It is a bold and perilous thing to attempt to point out, with any appropriateness of detail, the derivation of our Science and Art from Greece; for as we read in Faust, "Die Kunst ist lang," and we all know how manifold and profound is Science. That however, notwithstanding the enormous intellectual toil and consequent achievements during the present generation in both Science and Art, we do owe their present position primarily to the Greek, is a proposition which I believe can be thoroughly substantiated. But leaving so wide a theme, I shall apply myself to the more modest endeavour to present a few statements which may serve to illustrate some of the obligations we are under to the energy and prevision of the Greek mind; and in pursuit of this aim it will perhaps conduce to clearness if we confine our references almost exclusively to the contributions made by the great thinkers, prior to and inclusive of Aristotle, towards a solution of some of the great problems of life.

The need of something being said on the actual relation of Greek Thought to our own intellectual life is apparent, if we only consider for a moment the extremely conflicting statements made by different men. On the one side, we are favoured with eulogies so glowing
OUR OBLIGATIONS TO GREEK THOUGHT.

as to create the impression, in minds not familiar with the history of Science, that some of the Greek philosophers were very paragons of investigators. Hegel, with his intense subjectivity, scarcely knows how to express his admiration of their formulated conceptions of Being. Cuvier, occupying the position of a student of objective nature, says, "In Aristotle everything amazes, everything is prodigious, everything is colossal. He lived but sixty-two years, and he was able to make thousands of observations of extreme delicacy, the accuracy of which the most rigorous criticism has never been able to impeach."* It is remarkable how the strain of Cuvier has been caught by French naturalists. They write and labour as men conscious of rearing a superstructure of Natural Science on the deep enduring foundation laid by "le grand Stagirite." It is unnecessary to make quotations in illustration of the profound reverence, amounting in many instances to entire mental subjection, cherished during the Middle Ages for all that was Aristotelian. No man ever ruled over such keen intellects, and for so long a time, as did the creator of Logic.

On the other hand, equally strong language has been employed, which, if attention were paid to it alone, would produce the conviction that no greater calamity ever befell the interests of scientific truth than the prevalence of Greek ideas, and the domination over great minds of Greek forms of thought.

The strong statement of Roger Bacon, that, had he power, he would have all the books of Aristotle burnt, seeing they conduce to a waste of time, occasions of error, and increase of ignorance—this statement, though thought by Dean Milman † to refer only to the crude Latin versions which had plagued the laborious Roger, nevertheless has been taken as expressive of a judgment on Greek Thought in which many concur. And this tendency in many quarters to disparage the influence of Aristotle has been strengthened by the occasional observations of Lord Bacon, especially in his Opuscula Philosophica, who, while admitting the great power of the Greek, represents his natural philosophy as being more puerile than others have held it to be; and who, in illustration of his own famous idola, sets Aristotle forth ‡ as exemplum conspicuum of one kind of the triple false philosophers to be guarded against.

† "Latin Christianity," vi. p. 298.
It is obvious that views so utterly discrepant require the production of some historic light by which one of the extremes shall be seen to be false; or else the application of a solving principle that shall harmonize the main statements, even though the highly-coloured phrases in each be relegated to the fires of an unsparing criticism. In order to arrive at a conclusion free from the partiality of schools of thought, and, so far as possible, unbiased by what Butler, with sententious wisdom, calls that "delusive faculty"—Imagination, let us look at the actual facts, and see therefrom what the Greeks have given us, that, in its bearing on our efforts to solve some of the great problems of life, places us under obligation to them.

First of all, it is certain that we owe the beginning of some of the special Physical Sciences to Greek Investigators. The very enumeration of Aristotle's works might suffice to prove that, whether on sound principles or not, the Greek mind was occupied with most of the subjects now developed into well-established sciences. Recent attempts have been made* to set forth, in the full light of our more developed science, what are termed his crude notions, and his ignorance of important facts, as, also, to take away the glory of certain well-known anticipations of the results of modern research, by the insinuation that they were lucky guesses, and not the result of true scientific prevision. It seems, however, to me, to be a species of hypercriticism to look for the finish and accuracy of the superstructure in the labours of the foundation layers. It is unquestionable that Hippocrates and Aristotle began for all time the important sciences of Anatomy and Physiology; and, in spite of all detraction, to the great Stagirite must be ascribed the honour of discovering the first traces of a nervous system,† the germ of the doctrine of homologies,‡ and the law of economy, by which nature everywhere gives to one part what she takes from another. Aristotle, also, was the first to propound the progressive complexity of life which, in the hands of Oken and Kant, paved the way for our modern Darwinism. It appears to be well established that though much of his enormous labour in the department of mechanics was scientifically fruitless, yet he first set forth the doctrine of the "parallelogram of forces;"§ while to

Archimedes is to be ascribed the discovery of the principle of the lever, as also the hydrostatical law relating to the condition of floating bodies.* Optical science began in Euclid's detecting the law of the reflection of light.† Galileo himself declares that he found in Aristotle the principle of "virtual velocities." Of course, astronomy in some form was cultivated by the Orientals; but it is to the Greeks we owe some of the important truths on which subsequent astronomy has proceeded; for while, according to Pliny, Anaximander, and, according to Plutarch, Pythagoras pointed out the obliquity of the sun's course amongst the stars,‡ Aristotle's own argument in his De Caelo, ii. 14, proves, to use his own words, "that the earth is not only spherical, but is not large, compared with the magnitude of other stars." Nor is this all; for on the basis of the doctrine of the phases of the moon, as suggested by Anaximander, and reasserted by Aristotle, Aristarchus of Samos (280 B.C.) even essayed to obtain a measure of the distance of the sun as compared with the moon—displaying, for the age, an energy of mind surpassed only some one hundred and fifteen years later by Hipparchus in the establishment of the theory of eccentrics and epicycles.§

Now, as compared with the wonderful development of the various physical sciences within the past hundred years, these products of Greek thought may seem insignificant; but at all events we have inherited the results of these early labours, and owe to them the beginnings on which we have continuously improved.

Turning away from the sciences, let us attend for a few minutes to the processes by which scientific knowledge is acquired and its principles subsequently applied in form of argument. With certain reservations, hereafter to be noticed, I think it may be affirmed as a matter of historical fact, that we owe to the Greeks the method by which our modern science has achieved its wonderful success; as, also, the logical forms by the use of which the results of our Inductions are deductively employed in the elaboration of systematised knowledge. We live in an age of Induction, when men are eager for particular facts, and resent any formulated hypothesis which cannot be attained by a cautious ascent from the particular to the universal, or which is incapable of verification by well

† Ibid, p. 98. ‡ Ibid, pp. 142-3.  
directed observations. The clearness and certainty with which during the past two hundred years the highest intellects have traced, by means of minute observations and verified results, subordinate laws running up to an almost final unity—the approximate solution thereby obtained of the old-world dream of the "Many in the One," and the coincidence of this intellectual progress with a more perfected material condition and general culture—these considerations invest, for some minds, the modern Inductive method with a sacredness of its own, and foster the supposition that only of late years has the world discovered the key to the secret of nature. To Lord Bacon has been ascribed, by the popular voice, the honour of introducing the method which has recently been more scientifically formulated in the Canons of John Stuart Mill. Bearing in mind the dreary centuries before Lord Bacon, during which acute intellects, entangled in the meshes of a perverted Aristotelian deductive logic, sought in vain to construct sound theories of the universe, it is no wonder that he should have been hailed as a preacher of a new and true gospel of Science.

This cutting off of the modern method from all connection with the past has not, however, found acceptance in every quarter. Lord Macaulay, for instance, recognises the pre-existence of Induction among the Greeks, and claims for Lord Bacon the distinction of bringing to bear on men the more powerful motive of an increase of the material comforts of life to induce them to use more fully a procedure understood and practised by all men.* No doubt Lord Bacon's expressions, here and there, do lend an appearance of truth to these representations; but that it is an unsatisfactory statement of the scientific character of modern Induction is obvious. For though the actions and mental conclusions of the dyspeptic referred to by Lord Macaulay are based on a set of observations, that is a different process from the deliberate adoption of formulated canons applicable to selected instances giving evidence of a universal law, and regulated again and again in their application by an adequate verification. This means a subtle and elaborate process in which the Inductive principle is worked in full view of its bearing and its goal.

Now, in order to understand the relation of our modern methods of research to that of the Greeks, it is desirable to bear in mind two well-attested facts. The first is this, that sciences and scientific processes are developments, and often very gradual, of facts tabu-

lated and principles enunciated by a succession of inquiring minds. No science in its mature form was ever created by one mind, or even by one generation of minds. One age borrows from another. I do not think the doctrine of Pangenesis is established, but, with a view to illustration, I may say that if we were to apply that doctrine to sciences and scientific mental processes with the same reference to detail phenomena as Dr. Darwin and Mr. Galton have applied it to account for the peculiarities in human bodies, we should perhaps see, in the manifestation of a modern development, the expression, in definite form, of a germinal fact or thought that has been latent in inherited mental life for centuries. Continuity prevails in the sphere of mind, modified, it may be, by the element of spontaneity in our will. The Induction of Herschel and Mill is a great advance on that of Bacon, but finds its roots in his; while the Induction of Bacon, whether essentially an advance on the Greek or not, has its roots in minds prior to the Elizabethan age.

The other fact to remember is, that, for some cause in nature or society, the scientific tendency of the human mind received, soon after the decease of Aristotle, a decided check. Whether in the enormous and, considering the conditions, almost superhuman toil of the Greek intellect, between the appearance of Thales and the age of Aristotle, nature overstrained herself, or whether the social and political changes that supervened diverted the ablest minds to inferior purposes—at all events, history bears witness to a check on mental development in the direction of science as a whole, and of scientific processes as the absolute condition of all successful research. Not a man had the power to take up the great themes of Plato and Aristotle, and raise upon their labours a permanent superstructure. With the exception of an incidental discovery here and there, by such men as Aristarchus of Samos, and Hipparchus; a fanciful reproduction of Plato in Alexandria; a Lucretian poem on the Democritan theory, and a few additions to Aristotelian formal logic by Porphyry and Galen, we have scarcely anything of scientific interest. There is no originality, no strong and masterly development of principles laid down by the great Greek thinkers in Cicero or Seneca. What might have been done for ancient Greece and Rome had minds of equal energy and insight to those of Aristotle and Plato successively arisen, and, eliminating for further development the sound principles of their great ancestors, applied them to the interpretation of nature, this
is beyond our power to affirm. But we have to note the fact that until about the fifteenth century no such tendency appeared. The intervening period was, in its relation to scientific procedure, a period of suppressed mental development.

Bearing in mind then, that sound scientific methods are gradual developments, and that history affords witness to a check on the development of mind in this direction, let us now notice the actual position of Greek Thought in relation to Induction. In the loose sense of the term indicated by Lord Macaulay, the earliest Greek philosophers doubtless employed Induction. In the absence of written records detailing their procedure, we may be unfair to them in ascribing their conclusions to a narrower range of premiss than perhaps actually existed. But even with the scanty statements of Aristotle and Diogenes Laertius, we can see how the founders of the Ionic School must have compared a vast number of minute observations before they arrived at what they held to be the material ultimate \( \Delta \rho \chi \gamma \) of all things. In like manner Pythagoras, by a succession of observations on the mathematical characteristics of all that has bulk, and an analysis of all bodies into surfaces, surfaces into lines, and lines into points, would, by at least an imperfect Induction, arrive at the conclusion that the formal ultimate of all things was Number, of which one was the essence. It was also by a succession of observations, more or less wide, on the resolvability of matter into extremely minute particles; on the presence, after all resolutions had been made, of a final indestructible element; and on the action everywhere and in every thing of a mysterious Power, that Leucippus, and his disciple Democritus, made the ascent to their general law of ultimate atom \( \tau \circ \pi \lambda \eta \rho \varepsilon \), and one force \( \alpha \nu \gamma \kappa \). In the Dialectic of Socrates we have a remarkable instance in practice, of the skill with which he could cause his hearers to pass from one particular to another, eliminating step by step what was accidental and personal, till the rational truth remained, clear and imperishable. We must ascribe it to the strongly synthetic character of Plato's mind, and his perpetual insistence on a direct intuition of the eternal Forms or Ideas, that he gave no attention to the formulation of the initial Induction, which on the practical side of his Dialectic found such inimitable expression in his Dialogues. It is, however, an instructive fact, suggestive of the immense difficulties encountered by the human mind in its earliest endeavours to translate the realities of the
objective world into the subjective forms of science, that, prior to the time of Aristotle, there was no systematic attempt to study the mental processes involved in the establishment of philosophies of the universe, with a view to reduce them to an organized system for future reference and use. That this is true with respect to formal demonstrative Logic is evident from his own unchallenged statement in his De Sophisticeis Elenchis: "In regard to the process of syllogizing I found positively nothing said before me. I had to work it out for myself by long and laborious research." It is also in Aristotle that we find the first, and, I believe, prior to Lord Bacon, the last attempt of any value, to urge on students of nature the Inductive method, as the only highway to knowledge; to enunciate, and guard from misapprehension, its fundamental principle; and to explain the exact relation of the conclusions arrived at by its use, to the reverse process of Deduction. No man ever insisted more strongly on Fact as the desideratum of Science. The language he employs might have been that of Lord Bacon or John Stuart Mill. For instance in Analytica Priora, i. 30, he says, "The way with respect to philosophy must be the same as with respect to any art or science; we must collect the facts and the things to which the facts relate in each subject, and provide as large a supply of these as possible." Moreover he expressly distinguishes Induction from mere inference from example, i.e. from some particulars to other particulars; and gives the name Experience, ἐμπειρία, to the latter, as being possessed by man in common with the higher orders of animals. Nay more, Mr. Grote has collated passages from the Analytics and the Ethics which prove, that not only are the principles used in demonstration, if worth anything, derived from Induction, but that repeated and uncontradicted Induction carries with it the maximum of certainty.

It would occupy more time than can be spared for such a purpose, to enter into an exposition of the points of difference between the Induction of Aristotle and that of Lord Bacon. It has been said that Aristotle’s was merely Induction by simple enumeration—the getting at a general Law because of never having met, during the process of observation, with an exceptional or incompatible case; while

* xxxiv.
‡ "Anal. Post.,” ii. 19.
§ "Aristotle,” vol. i. p. 375.
Lord Bacon's was the selection of such instances as give evidence of a universal Law, and the examination of those specimens of the class which have nothing in common but the property in question, together with the observation that objects not possessing this property, are characterised by an absence of the essential attribute of the class.* Now this may be true, though there is a passage in the Analytica Post. i. 18 in reference to the "non-omission of the facts and properties which belong to a subject," leading to a different conclusion. But, even granting this, it simply means that Lord Bacon's exposition was a development of Aristotle's, as Mr. Mill's celebrated Canons are a development and improvement of Lord Bacon's. But that Induction, in its essential nature, as a method for the study of nature, was the product of Greek Thought is, I think, apparent.

Accepting then, as I suppose every one must, that Induction elaborated to a certain point was brought before the attention of the scientific Intellect by the Greeks, and that, subsequently, it was more developed by Lord Bacon, it may still be asked, Was the one an outgrowth of the other, or was it an intellectual phenomenon in England, coincident in nature but historically unconnected with that of Greece? Now, this question may be answered, partly by a reference to philosophical considerations. On the basis of the doctrine of Continuity, it may be affirmed that the Baconian view of method had its roots in a prior knowledge. The philosophical ideas of the Englishman were associated with influences, consciously or unconsciously, received through the perusal and study of the writings of the Greek. The very terminology of Lord Bacon is proof that his mind was saturated with Greek thought. Why a study of Aristotle, during more than a thousand years, should not have issued in a development of the Greek doctrine of Induction, but did so issue in the solitary instance of Lord Bacon, is a question involving a general study of the religious and social life of centuries, and of the idiosyncrasies of Bacon's mind. But in view of his early acquaintance with Greek philosophical literature at Cambridge, it follows, from the application of the great law of Continuity to mind and its operations, that he derived Induction as a Method from the Greeks.

Further light is thrown upon the subject by his own words.

Frequently, indeed, influenced by his disgust at the perversions of Greek philosophy by the schoolmen, he makes use of language which conveys the idea that he owed nothing to Greece, as may be seen by referring to Novum Org., Aphorismi 120–123. Yet, on the other hand, he distinctly admits in Aphorismus 122, commencing with the words, "occurrat etiam et illud," that the matter treated of, could have been traced back to certain authors among the Greeks, "ad aliquos ex Graecis ipsis referre," and that it would be possible to obtain from them concurrence and sanction—"astipulationem et honorem inde petere.* This state of the case is sustained by his letter to Trinity College on the publication of his "De Augmentis Scientiarum."†

Just one word in closing my remarks on our obligation to Greek Thought as respects the Inductive method of enquiry. The Aristotelian Induction, though sound in the main, was very defective, both in its formulation and its application to the purposes of science. Aristotle failed to devote to its scientific elaboration the marvellous analytic powers which created the Formal Demonstrative Logic. He spent too much time upon showing the subjective laws of thought which connected Induction with the syllogism, and both in his theory and practice he gave insufficient prominence to verification.‡ But let us not judge him harshly as a thinker. It is not to be wondered at that the man, who, according to Diogenes Laertius,§ wrote as many as four hundred books, comprising 445,270 lines; who created the vast Organon of Formal Logic; earned by his treatises on Rhetoric and Poetry the title of "Father of Criticism;" thrashed out and separated the crude and permanent truths of all extant systems of cosmogony; laid the basis of Natural History and Biology by a huge collection of isolated facts; anticipated by partial Induction, blended with philosophic insight, some of the remarkable discoveries of modern times; waged more than equal war with his illustrious master, Plato; produced sheer out of his own brain a treatise on Ethics, which the proudest universities of modern times accept as an unrivalled text book; left to posterity one of the most subtle pieces of analytical discussion on the nature and powers of the soul; and wove from his own intellect that extraordinary metaphysic of his—I say it is not to

‡ See "Grote's Aristotle" i. pp. 376-7.
§ Ibid, v. 21; see also "Arist. Opera" (Weise) pp. 18–20.
be wondered at that, amid such intense and varied toil, and dying at the age of sixty-three, he should have found neither time nor strength to raise the Inductive method to a perfected scientific form. It was enough, amidst his other achievements, to survey in rough outline the highway to scientific knowledge. We need not detract from his just renown when, as is proper, we recognise the subsequent services of men who caught his truth-loving spirit, and completed the task he so bravely began.

In speaking of methods, I have also alluded to our derivation of Formal Logic from our Greek predecessors. I have already quoted words of Aristotle to the effect, that prior to his own labours, Logic, as a formal science, had no existence. Reference has sometimes been made to the logical puzzles of Zeno, the Eleatic, as also to the methodical aspect of Plato’s Dialectic, in proof of the pre-Aristotelian origin of Logic.* This, however, is a mistake, arising from a confusion of a use of the syllogistic style of reasoning with the formal science of reasoning. Aristotle himself expresses his utter dissatisfaction with the four kinds of argumentation employed by the Sophists (didactic, dialectic, peirastic, eristic), and he considers Plato’s desultory habit as a weakness. Sir W. Hamilton is a great authority, and, in calling into question his statements, one has to believe that in the vastness of his range over the history of philosophy he now and then allowed fallible acts of memory to do duty for quotations of actual language. It is only in this way that we can account for his assertion that Plato first enunciated the principle of Contradiction. The references he makes to the Phaedo, p. 103; Sophistes, p. 252; Rep., iv. p. 436; vii. 525, only show that in practice Plato availed himself of this principle—not that he gave a formal scientific statement and defence of it, as a law of thought, ever after to be recognised, as did Aristotle in the third book of the Metaphysics. Those familiar with Logic as a science know well that in its fundamental principles and substantial forms it is, at the present day, what Aristotle made it. As might be expected, in the progress of the human mind, improvements, by way of addition and removal, have been made; though, in the case of some so-called improvements, it is obvious that they had not escaped the keen eye of the great mental analyst; as, for instance, it will be seen by the

Analytica Priora, i. xxvii., that he saw the possibility, though he denied the utility, as a logical form, of the Quantification of the Predicate.

The obligation we lie under to the men, (in this case to the man) who first drew out from the tangled web of common discourse the strictly scientific laws of thought, is really very great. Those who will reflect upon the intricate and subtle mental processes involved in even a common piece of reasoning, and the great difficulty of holding each step of the subtle process in isolation enough to define its formal relation to every other, will see what marvellous discrimination, analytic skill, and power of synthetic arrangement, together with exhausting toil, were involved in the creation out of the tangled threads of all kinds of reasoning, of the exact laws of thought, according to which alone the passage from one point to another is, under all arrangement of terms, admissible. I am aware that many may be disposed to question altogether the benefit supposed to be conferred on the present generation by the transmission, even with modern modifications, of this logical product of Greek Thought; but with all due respect to these unlogical people, though they may not like Logic, I venture to affirm that its creation as a science is a boon. If, with Terence, we each can say with emphasis, "I am a man, and I deem nothing human a matter of indifference to me," so, as students of science in its highest and truest sense, we ought to be able enthusiastically to say, "Nothing having the form of science can be a matter of indifference to us." This universe is most beautiful. The domains of matter and mind challenge our research. All around, law, strong, uniform, interblended, holds beneficent and ceaseless sway. In the name of Science, then, he must be regarded as a man worthy of honour, who, selecting for his sphere of research the department of universal nature in which mental processes pertaining to reasoning are the phenomena to be examined, resolves all their apparent tanglement into the orderly dependence of invariable law, and expresses this organised law in terms that render the human mind ever after master of the subject. Such a man accomplishes for one department in the mental sphere what the astronomer accomplishes in the material sphere, when, detecting and reducing to available formulae the laws which find embodiment in the movements of the heavenly bodies, he blesses the human intellect by doing his part to put the mind in possession of an exact knowledge of the
constitution of the universe; in other words, to create universal science.

That this product of Greek Thought has been perverted to uses and ends it could never properly subserve, and that, as a consequence, the material progress of society suffered injury, this, I think, must be admitted. Yet, surely, because men are foolish enough to misapply an instrument, this is no valid argument against the advantages to be derived from an application of it to objects suitable to its nature. Moreover, it by no means follows that the intense and, as some would say, the absurd devotion to metaphysics by means of the Aristotelian Logic, during the Middle Ages, was in every respect a loss to our modern civilization. We all know what a wonderful means of mental discipline the thorough study of the science of Formal Logic is to those who have the heart to work hard in mastering its principles and details; and, if there be any truth in the modern doctrine of the transmission of mental powers and qualities, I imagine that, could we but trace the processes through which our modern intellect has attained to its strength and precision, it would be found to have inherited not a little of its power and love of exactitude from the men whose mental life was governed for centuries by the severities of Aristotle's Formal Logic. The laborious Father of Logic claimed no perfection. He, with modesty, regarded himself as a helper of his fellow-men in their endeavours to reduce all things to scientific form.*

There is, however, another aspect of the activity of the Greek mind which throws some light on our relation to it. We owe to it the opening up of the great problems which ever since have engaged the earnest thought of all great intellects. A German author has very aptly styled the founders of Greek philosophy "Path-finders." I believe it to be true of our own personal experience that, during the first seven years of our life, we acquire more fundamental enduring knowledge than during the whole remainder of our existence on earth. The objective world of multiform fact and subjective reality of the main data given in consciousness, embracing, as these do, the subject-matter of all future combination and reflection, are the acquisition of early childhood. Never again does the mind grasp such stupendous facts, or acquire knowledge of so vast a variety of things. Classify the objects of sense it may, and rise

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also to abstract conceptions in endless variety; but the knowledge of early years affords the base and material of all subsequent modifications. And, in like manner, though the comparison is not perfect, it will be seen in a careful study of Greek philosophy, that during the period covered by its developments up to the days of Aristotle, it really occupies a position, relative to all subsequent speculations, similar to that of our early childhood to the intellectual operations of our succeeding years. Those thoughtful Greeks, as compared with other people, appear to have looked out for the first time on the great Objective, under the influence of a philosophic instinct, and to have grasped once for all the great problems destined to absorb the highest thought of coming generations. In them arose the intense yearning for unity amidst conflicting diversity, which, from that day to this, has been the guiding spirit of all scientific toil, and the indestructible evidence, within the breast of the philosopher, of the existence of an all-comprehending law. With respect to the constitution of the physical and mental worlds, to them belongs the honour of having beaten out, in spite of the lack of an antecedent literature, the principal paths along which our course must be taken if we would end our quest in the goal of a final solution. Possibly, amidst the wealth of our scientific appliances, the ample means at our disposal for minute verification of our hypotheses, and the remarkable practical issues in daily common life of our acquired mastery over many of nature's secrets, we may at first be half inclined to look, with feelings bordering on contempt, upon the ancient Greek cosmogonies. But a closer inspection of the facts of the case will reveal to us that the noble passion for scientific precision and unity, so characteristic of our age, has been transmitted through the contagion of Greek feeling in higher literature, and that nearly every theory of the ultimate constitution of the Kosmos, advocated within the last two hundred years, is but an enlargement, and not always an improvement, upon the systems propounded by the Greeks. It is unfortunate for us that we have, in most instances, the conclusion arrived at, with only slight indications of the processes of which they were the issue. Yet it may suffice for our purpose just to notice the remarkable similarity between some of the ancient and modern theories.

Take the system of Pythagoras, which is said to have postulated Number as the ἀρχή of all things—one being the essence of Number.
In the absence of Pythagorean documents, and consequent upon the divergences of later disciples of the school, difficulty has been felt in getting at the exact meaning of Pythagoras himself. But when we remember his intense love of order, his inheritance of the Ionic craving after the ultimate basis of the manifold Kosmos, and his predisposition as an analytic mathematician to seek the ultimates of bodies in surfaces, of surfaces in lines, and of lines in points, it seems to me to be the most natural solution of his system to say, that, by some such process he found the Kosmos, in its last analysis, reducible to the one—all separate bodies being, formally at least, numbers—i.e. determinate combinations of the ultimate unit. Whether his ultimate unit was what Plato would call the formal essence, or was a quasi-material entity out of which the invisible was evolved, I do not now discuss. My purpose is to observe that in this theory we have substantially the germ of those of modern times, sanctioned by influential names, which either resolve all material bodies and elements into ultimate centres of force, or into the infinitely small atoms of which no quality save that of unity can be affirmed; nor is the goal reached by Pythagoras far removed from a well-attested molecular theory, which sees in molecules of different kinds fixed numerical combinations.

Now, as then, the one is the basis of all.

Take another system, that of Empedocles, who, rejecting both the Eleatic theory of Being and its opposite, the Heraclitean Flux, arrived at a primitive chaos of four eternal elements which, under the antagonistic action of ϕιλία καὶ νέικος, became now segregated into bodies, and now separated—cycle of segregation being followed by cycle of separation, according as ϕιλία or νέικος were in the ascendant. Now, making, as we ought, all due allowance for the poetical form into which Empedocles cast his thoughts of antagonistic forces, by the use of the terms ϕιλία and νέικος, we seem to have in this theory the first expression of what we know as the Nebular hypothesis, and also of those everlasting cycles of evolution and dissolution on which Mr. Herbert Spencer has descanted with no little eloquence.

Take one more, the system of Leucippus and Democritus. Rejecting the four original substances of Empedocles, as also the nebulous mass of infinitely varied substances, out of which, under the potent action of the eternal νόνς, Anaxagoras built up the
Kosmos,—Democritus, the expounder of his master, Leucippus, appears to have arrived, in his last analysis of organised and unorganised bodies, at ultimate atoms devoid of all quality, but varying in size and weight; and basing his conclusions, with respect to cause of combination and quality, upon an exclusive regard to power objective to mind, he postulated, in place of the eternal νόος of his predecessor, an invisible mysterious energy, or bare Force, which he designated ἀνάγκη—the possibility of its effecting motion being accounted for by the presence between the atoms of vacuum, τὸ κενὸν.

It is only necessary to state these few particulars in order to be reminded of a later Lucretian development of them, which in its turn has been the progenitor of a cosmological system held in high repute by a distinguished modern school. Mr. Herbert Spencer, urged by that rigorous logic of which he is so able a master, evidently sees that he must, by the very conception of Evolution as a getting of all differentiation out of what is undifferentiated, trace all things back to an ultimate in which no quality is found. Modern atomists enjoy advantages in the results of analytic chemistry, and greater precision of terms; but the conclusion is emphatically Democritan; and probably, under logical pressure, it will still be held by some philosophers, in face even of the enormous physical and metaphysical difficulties which other more wary natures perceive in obtaining—from the bare surface contact of two immutable things, devoid of quality, and by the action on them of a purely mechanical force, which itself parts with no quality—an actual quality which shall possess within itself a capacity for the further creation of difference.

In estimating the connection between modern and ancient conclusions, it behoves us to avoid the fallacy of confounding coincidences with derivation; and we should be careful to abstain from the delusive habit of importing into the terms and propositions of one age the ideas of another. “Great minds think alike,” as we say in pleasantry; and we are apt to see our theories everywhere.

But anyone who attends to the historical transmission of the great problems relating to the origin of the world, noticing, as he must, how every powerful thinker has referred to previous attempts at solution, will see at once that our modern cosmogonies are not independent and original, but essentially an exposition
under favourable circumstances of the theories promulgated by the Greeks. Spinoza had been a student of Greek literature before he framed his gigantic argument in proof of only One Being, and it would be contrary to the known laws of mind to suppose that he was not elaborating the old Eleatic doctrine of One and All. Hegel, a profound Greek student, in arriving at his conclusion that reality could be predicated of neither Being nor non-Being, but only of the relation between poles of thought, consciously or unconsciously produced a phase of the Eleatic and Heraclitean systems, modified by the metaphysical doctrine of his prototype Anaxagoras, that truth was a mean between affirmation and denial. And the researches of every distinguished scientist of our age into the complicated constitution of the material world have been greatly assisted by the hand of Democritus, which somehow has ever been seen pointing to an ultimate more or less atomic. The Greeks have set up a goal of research. They have suggested the resolution of the complex into the simple; they have implied in their demand for unity the prevalence of universal law; they have set the example of bold and persistent effort to trace the Kosmos from a primal simplicity; and others, profiting by their toils, have established old conclusions on a broader basis, though they appear not to have either set them aside or gone beyond them.

There is, however, one other point on which it would be desirable to say a few words. I refer to the great questions in mental science, which have been raised for all time by the Greeks, and toward the settlement of which they have contributed not a little; but space forbids.*

And now it only remains, in conclusion, to say a word or two on the spirit which characterised their efforts in the sphere of philosophy; and here I cannot illustrate my meaning better than by quoting the words of Mr. Ruskin. He says, in his Aratra Pentelici, "And as he strove only to teach what was true, so in his sculptured symbol he strove only to carve what was right. He rules over the arts to this day, and will for ever, because he sought not first for beauty, not first for passion or for invention, but for rightness, striving to display neither himself nor his art, but the thing that he dealt with in its simplicity. That is his specific character as Greek... The essential Hellenic stamp is veracity. Eastern nations drew their heroes with eight legs, but the Greeks

* This portion of the lecture is omitted for want of space.
drew them with two; Egyptians drew their deities with cats' heads, but the Greeks drew them with men's; and out of all fallacy, disproportion, and indefiniteness, they were, day by day, resolutely withdrawing and exalting themselves into restricted and demonstrable truth."* Again, "Distinctively from other races . . . this is the work of the Greek, to give health to what was diseased, and chastisement to what was untrue. So far as this is found in any school hereafter, it belongs to them by inheritance from the Greeks, or invests them with the brotherhood of the Greek."† Finally, "Not that a Greek never made mistakes. He made as many as we do ourselves nearly—he died of his mistakes at last, as we shall die of them; but so far as he was separated from the herd of more mistaken and more wretched nations, so far as he was Greek, it was by his rightness."‡

Now in the sense in which these expressions may apply to Greek thought in art, in that same sense they may be applied to Greek thought in science and philosophy. It was an intense love of reality, a yearning to get at the foundation truth of things, that raised up school after school to accomplish, if possible, what others had left undone, or had done imperfectly. They longed above all things to bring their minds into correct relationship to objective nature, to attain to conceptions that should be the exact subjective counterpart of the constitution and order of the universe. Aristotle and Plato were dissimilar types of men, yet in their works they both evince a mastering passion to know exactly what is, irrespective of profit and loss. In the Analytics, as also in the Metaphysics, we see a mind—keen, searching, and painful—piercing into every conceivable cranny of thought to clear out the false, and to set forth, even to an infinitesimal shade, whatever is true. Endowed with richer fancy, and more exquisite sensibility than his great rival, Plato, in his own inimitable way, reveals the same burning passion. Thus, in the Phædo, he says: "Many a man has been willing to go to the world below in the hope of seeing there an earthly love—a wife, a son—and conversing with them. And will he, who is a true lover of wisdom, and is persuaded in like manner, that only in the world below he can worthily enjoy her, still repine at death? Will he not depart with joy? For he will have a firm conviction that there only, and nowhere else, he can find wisdom

in her purity." And then also, in that wonderful compound of poetry and allegory and philosophy, the *Phaedrus*, it is well known how he depicts the enthusiasm of the truth-loving soul.

Nor does the appearance of the inferior class of Sophists, with their endless trifling and logical riddles, at all impair the truth of our proposition, but rather substantiates it by presenting a foil, which sets forth in stronger relief the spirit of all the great leaders in philosophy. Even the teaching of Protagoras, based as it was on the Flux of Heraclitus, and designed to show that eternal, absolute truth was impossible, even this, paradox as it may seem, was promulgated by him in the interests of truth.

However fruitless in material results some may consider the astonishing energy of the Greeks to have been, none, I suppose, can doubt the reality of the benefit conferred on mankind by such a yearning after truth for its own sake. The material comforts and conveniences of life are a legitimate object of care and forethought to prudent men; but it is a degradation of science and a species of intellectual bondage when the prime motive of research and effort to know the order of the universe is to amass wealth and to live in luxury. The example of the Greeks is a boon to any people in danger of being governed, in their highest endeavours, only by the principles of a sensuous utilitarianism. The love of science as science, the pursuit of truth purely as truth, so eminently characteristic of some of our own day, is Greek. It is not purely British, I will even say it is not Baconian.* Knowledge may be power, but it is not wise to put the uses to which knowledge may be applied in the forefront, as the prime incentive to the pursuit of science. The human mind is never so healthy as when it seeks to know for pure love of knowing, and is eager to embrace truth wherever found, and whithersoever it may lead. Unless we are prepared to libel the whole of our countrymen, we must be prepared to admit that this spirit does exist in some degree amongst us. It may be questioned whether it is as prevalent as the interests of science and philosophy demand. But every one must see that a familiar acquaintance with the nature and scope of Greek Thought cannot fail to conduce to its cultivation; and as those in whom it is most conspicuous are, directly or indirectly, inheritors of Greek ideas, it is a fair presumption that the truth—

* I refer to Bacon's words, "Knowledge is power;" i.e. get knowledge for what it will bring you.
loving element in their own nature has received stimulus to special
development from the contagion of Greek literature.

But I must close this too long address. The subject is very
wide, and admits of a variety of aspects. But I trust enough has
been said to indicate, in rough outline, some of the obligations we
are under to the Greeks for their expenditure of thought on some
of the greatest themes that can occupy the attention of the human
mind; and that too at a period when, in the absence of any pre-
existing literature and unaided by the accumulated results of
previous research, they, on behalf of themselves and all posterity,
opened up the great lines of thought, and handed down, both in
their conclusions and in their spirit, a treasure of which modern
science can avail itself. We cannot but sympathize with the deep
ineradicable yearning of those great natures after a solution of the
profound mysteries associated with human existence; and if some
of us, sharing in a light not then vouchsafed to them, can strike
on a clue leading to a final solving of the momentous problems
still before us, it is nevertheless becoming that we regard them as
worthy of all honour for the service they rendered to the cause of
truth.
The site of this Castle—perhaps selected by the Kelt, who according to his need and his ability made it his strong place, used by the Roman, added to and improved by the English, and then seized by the Norman, who built his keep upon the even then antient mound, extending the fortifications and forming his dwelling-place within the lines of his predecessors' works—is probably well known to all present.

A high hill on the south, gently sloping ground on the north, the valley nearly at its termination on the east, and on the west the open flat land, formerly, as we shall see, much more marshy than at present; such was the position chosen as a dwelling-place and a stronghold by our ancestors in days long past. It would be of course impossible to say with any certainty what time has elapsed since the valley in which the town of Plympton is situated was first inhabited by the human race, but there can be no question that man has long had his home there, and that from very remote ages it has been the scene of busy life, intermingled with periods of tumult and bloodshed.

Except in one particular the main features of the locality have changed but little, but that particular is an important one. While now the sea is two miles from Plympton, in early times it flowed nearly up to it, and at high tide, even in mediaeval times, it would seem that the waters of the sea washed the walls of the Castle.

Tracing the course of the estuary of the Lara from Cattewater, we shall find that the sea, now confined within narrower limits by art, and restricted in its flow by natural changes, ran up the valley to near about the place now forming the western side of the graveyard of Plympton St. Mary Church. Thence it branched off, tending north-east and south-east, the former stream flowing over the flat,
now the site of the railway station, and so on up the Newnham valley; the latter running up the Plympton valley, its waters mingling with the stream, now a small one, which still comes down at the back of the houses on the south side of the main street of Plympton. At the head of this valley the position of defence was laid out; and whether it was a stronghold of the Briton, or was formed by his successors, his conquerors, or whether the Dane took possession of it and raised his fort there, no one can deny that in these early times the site must have been an important one, and that a population there settled must have needed a resort for safety and protection. I do not think, however, that the Dane obtained a settlement there. We have strong evidence of his having done so in other parts of the county, more especially north of Tavistock, but nothing is recorded to justify us in supposing that he gained any permanent settlement in this place.

The name Plympton is Saxon without doubt. “The suffix ‘ton’ constitutes a sort of test-word,” says Mr. Isaac Taylor, “by which we are able to discriminate the Anglo-Saxon settlement.”* “A tun or ‘ton’ was a place surrounded by a hedge, or rudely fortified by a palisade;” and if the fortified enclosure at Plympton, formed by the English colonist on the stronghold wrested from the Kelt, had an earlier name, it is lost in that given it by the conqueror, and now preserved to us.† The derivation of the remaining half of the word is not so clear. Superficially it would be said to mean the town on the Plym, the river. But if it were so, from whence does the river obtain its name? It cannot be the town upon the river Plym, simply because the town is not, and never was, upon the river we now know by that name. The water round about Plympton was tidal, fed to some extent—a slight one—by springs, but for the most part water from the sea. The nearest stream is the Torry river, or Torry brook, which I take to be an older word than Plympton.‡ The river Plym flows and flowed much in the same direction now as in pre-Norman times, a considerable distance from Plympton. Dyer, of Exeter, in one of his amusing books§ lays it down positively that the word is a compound one of three syllables; that “P” stands for the Keltic “pen,” a head; “leim,” or “lim,”

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† Stubbs, “Const. Hist. Eng.” vol. i. p. 82.
‡ Keltic, Tor = high rock, Rhe = water.
or "lym," Gaelic for a harbour; and "ton," Anglo-Saxon; thus making the word to mean "the enclosed place at the port head." We need not spend time in refuting such a derivation as this. Baxter, an old writer, derives the word Plym from Pilim, which he says signifies volvere, to roll.*

I am inclined to think that the simplest explanation is the most probable, and that in the word Plym we have the name of a tribe or family, which, or some branch of which, made the spot we are now considering its home. We constantly find "ton" associated with the names of clans, tribes, and families. In Durham and Shropshire the Maurings, or Myrgings, a Frankish clan, are commemorated in Merrington; the Harlings at Harlington, in Bedfordshire; the Scyllings at Shilvington; the Hælsings at Helsington; the Thurings at Torrington, in our own county, Thorington, in Suffolk, and Thorrington, in Essex; the Ardings at Ardington, in Berkshire; the Irings at Errington, in Yorkshire; the Allings at Allington and Alvington; and the Varini and Billings at Warrington, Werrington, and Billington.†

If I am correct in my conjecture, we may assume that the family whose name is thus preserved was a small one, but still widely scattered. We have Plymstock, "the place surrounded with piles." Another Plympton we have in what is now a farm near the coast, not far from the Bolt Head; and there are others in the county. We have Plymtree, near Collumpton; and the list, taking in other counties, might be much extended. Many of the places are small, some only farms, and although it is impossible to trace any connection between them now, there must be a common origin for the name; and while I am unable at present to indicate any family or tribe with which they may be identified—the nearest approach being the Pealings, a tribe of Frisians who have left their name at Pallington‡—I think the explanation I have suggested is worthy of consideration.

Omitting of course all reference to Roman work, there was no such thing in England as military architecture until the Norman Conquest, but works of offence and defence of a military character

‡ "Arch. Journal," vol. xxiv. p. 292. I have to express my acknowledgments for great assistance derived from the valuable papers of Mr. G. T. Clark in the "Archaeological Journal," and elsewhere, from which I have largely quoted throughout this paper.
were very numerous, and existed from an early period. These works were for the most part formed of earth and wood, and consisted of banks, mounds, and ditches; the two first generally formed by throwing up the materials obtained by the excavation of the latter. The study of these earthworks is very interesting, and, roughly speaking, they may be divided into two well-defined classes—those upon hills and high ground, the outlines of which follow the natural contour of the land and are consequently irregular in form; and those upon low ground with high banks of a definite plan, in which the natural form of the ground might as far as possible be made useful, but without in consequence sacrificing the intended regular form of the enclosure.

The first of these classes of earthwork may be ascribed to the early British tribes, the latter may be set down as the work of their successors, the later Kelts, the English, or the Danes.

I believe that the earthworks at Plympton are the work of one of the latter; and we may safely assume that they are post-Roman but pre-Norman. Pre-Roman in their present state they certainly are not; if the early tribes had selected such a place as their camp, the mound and banks are more important and extensive than anything they would have thrown up; and the Norman would not have raised such a mound as now exists. Further, if the Norman had not found a mound ready to his hand, instead of the round shell keep, the remains of which we have, he would have erected a rectangular keep, as he always did unless he raised his new building upon an existing superstructure, to the outlines of which it was made to conform. It is now the better opinion, that where the mound is found to be the principal part of the defence, the work is decidedly of a Teutonic, and not of a Keltic type.

At the same time it is not at all improbable that we have at Plympton the outlines of a Roman camp, and that a Roman fortification of some kind was in existence there. The rectangular form of the enclosure is some evidence in support of such a theory. The Roman road ran very close to it; the names of the Ridge Lane, Ridgeway, Voss, and Dark Street Lane, clearly show that there has been a continuous habitation of the neighbourhood. But the great mound is certainly not Roman, for the pretorium or citadel was never placed upon an artificial height.* Still the regular form of

* The remains of a supposed Roman galley were found at or near Newnham Park some years since.
the enclosure, the undoubted proximity of the great road, the im-
portance of the position, and the unquestionable evidence of a
Roman population in the immediate neighbourhood, goes far to
show that there was an early Roman work of some kind here,
perhaps placed by the Roman soldier upon the defensive work of
the Damnonii.

We have at Plympton the great mound and the banks of the
enclosure below, clearly to be traced, and in their present state
we are able to examine at the present moment a military work of
great interest and importance, in a remarkably perfect state of
preservation, the history of which carries us back to the days of
the Roman in Britain; the English earthworks being probably, as
I have said, not an original work, but an addition to banks already
in existence, which banks were Roman.*

Here then we have a large mound—a truncated cone—about
fifty-five feet high, and about seventy feet in diameter at the top.
This was probably formed to a great extent, if not entirely, from
the accumulated soil obtained by the excavation of the ditch which
completely surrounds the mound, or rather did so within a com-
paratively short time; now, in some parts, the ground has been
filled in.

This mound stands on the eastern side, or rather end, of an en-
closure rectangular in shape, surrounded on every side except the
east by a high bank of earth, which, like the mound, was formed
by throwing up the materials of an excavation on the outside to
make a deep ditch. The mound was situated nearly in the centre
of the eastern extremity of this enclosure, but tending a little to
the south. The height of the bank at present varies. The enclosure
within the ditches contains a space of about 710 feet long by 380
feet broad.

On the western side of the enclosure is another work, in which
advantage has been taken of the natural formation of the slate rock,
which indeed seems to project to a great extent over the whole area
of the Castle. Around this are evident indications of entrench-
ments. On the eastern side, beyond the ditch of the mound, is a
little plain, now occupied by the church of St. Maurice and its
graveyard, and houses; and then on the north and east the
ground again slightly rises. This little plain is surrounded north,
south, and east by roads, and by the ditch of the mound on the

west; and here also I think may be traced the remains of ditches which formed part of the defences of the Englishman, but which
were abandoned by the Norman. There is, however, nothing but
the general appearance of the land to favour such a supposition.
Instances of such a disposition of the ground are sometimes met
with, a central mound with moated and banked enclosures north
and south, or east and west, as the case may be.

The Chateau des Olivets, an earthwork measured by Mons. de
Caumont, precisely corresponds with my idea of what the Plympton
earthworks might have been; and on comparing it with the plan
of Plympton, its resemblance is apparent.

Guided by other examples, the entrance to the Saxon "ton"
would be on the western side, opposite the mound, at a point as far
as possible from it; but here I think that the entrance must have
been originally, as in later times, nearer the principal point of
defence, as there is no indication whatever of a break in the earth-
work on any side except where the mediæval entrance was. Still
there is something to be urged in favour of a western entrance, for,
as I have just said, taking advantage of the natural form of the
ground, the constructor of this defence formed a second enclosure
which was perhaps made to cover the entrance, while, as we shall
see, this also I believe formed part of the later fortification.

The ground-plan of all that I have mentioned can be traced by
the most casual observer, and the important mound and the banks
and ditches are as apparent to us dwellers on the threshold of the
twentieth century as they were to the Danish marauder in the
ninth, or to the Norman invader in the eleventh century.

But the mound, banks, and ditches were not sufficient protection
for the English franklin, nor would they alone have assured the safety of his family and possessions within the enclosure, or of the flocks and herds which in peaceful times pastured on the low meadows north and east of the ton. Nor would those outside, who looked up to him for protection, have been satisfied with such provision alone against a time of danger.

Upon the banks, and securely fixed in the solid earthwork along the outer edge above the ditch, were placed strong palings of wood, which formed a substantial palisade. This palisade completely surrounded the main enclosure, and in the more important places was strengthened in parts by little towers, also of timber. The water too, filling the ditch, formed an important feature in the works of defence. It is difficult to imagine that the present ditches, now partly cultivated as gardens, and used in other ways, could ever have contained any considerable body of water. And yet such must have been the case. I recollect well two large pools north and south of the mound, which are now both filled up, and one built over. Many Plymptonians remember a great deal of water in the ditches north, south, and west. Old inhabitants have fished there. Leland speaks of the great store of carp therein. Still further back, in a document dated about 1232, the sea, by which of course is meant the tide, is spoken of as reaching usque ad castrum. Old leases of houses on the north side of Underwood contained clauses giving to the lessees the right of fishing in waters which flowed up the valley towards Plympton Castle. And lastly, an old woman of Plympton, who died about the year 1834 at the age of ninety-four, used to say that her mother had told her that she recollected vessels coming to the quay opposite the Church of St. Mary, where there was a boat-house. Other old persons now alive recollect boats coming very far up what are now the marshes. To some extent this has been altered by the embanking which has been effected; but independently of this, there is in this neighbourhood much less land covered with water than formerly.

We have not only written descriptions which very clearly show us what these English strong places were like, but also pictorial representations.

Colmier, Archdeacon of Terouane in the eleventh century, writes,* describing the chateau of Merchem:

"The rich and powerful first secure a strong place for their personal safety, and the keeping of their prisoners and their wealth. They commonly throw up a mound of earth, surrounded with a deep ditch, upon the inner edge of which they establish a stout palisade of squared timber, strongly bound together, equal for defence to a wall, and strengthened by turrets or towers. Upon the centre of the mound is placed the residence, only to be approached by a steep bridge across the ditch."

This very clearly shows what the disposition of such a place as Plympton must have been before the Norman Conquest. On the summit of the mound was the residence of the chief and his family. Mons. de Caumont, the well-known French antiquary, who paid much attention to this class of fortress, says† that sometimes they were constructed in wood, and sometimes in stone. The importance of the place did not determine the material of which it was built. Castles belonging to powerful men, situated in localities where materials were difficult to procure, or to transport, had only walls of earth and wood, while others of much less consideration had masonry walls, where stone was abundant, and the skill to use it available.

The mound, where artificial (for a natural eminence often determined the position of a castle), was always of a regular shape, that of a truncated cone.

The residence upon the mound was approached from below by a bridge of timber, which spanned the ditch, and reaching perhaps to the top, perhaps only half-way up, was supported by wooden props and struts, in the ditch and against the sides of the mound.

The Bayeux tapestry clearly shows us what kind of a building the Norman found in England, and indeed also what kind of building his immediate ancestors had made use of in their own country. We have the representation on the tapestry of the fortress of the city of Rennes, and of the taking of Dinan by the army of William in 1065. These towns are represented as simply keeps, seated upon their mounds. At Dinan we have not only the siege, but the resulting capitulation. The besieged are depicted defending their ramparts; the warriors, at the head of the wooden bridge thrown across the ditch, prepare to fling their javelins at the attacking party on horseback, who are evidently supported by the

† Op. cit. p. 73.
two soldiers, who are endeavouring to set fire to the fortress. One of these latter is apparently wounded. However imperfectly the scene may be represented, we can very easily see that the fortifications are of wood, formed by upright pieces fastened to one another. This is also evidenced by the men with torches trying to set the building on fire.

Below the mound, but within the main enclosure, various wooden buildings were erected. These were the houses of the servants of the lord, and the barns, cattle sheds, and other belongings of a large establishment.

In the outer enclosures, where they existed, the cattle were ordinarily kept, and at Plympton their feeding ground was the Hayes on the northern side, still retaining its ancient name in the meadows outside the Castle boundaries. Below, running east and west, and forming the boundary on the south, was the street of the little town, the inhabitants of which, the churls, looked to the thane for protection in time of need, and shelter if required, they on their part giving him their services, as he could demand, when he was engaged in warfare with an enemy. We may be sure that the lord of Plympton sallied forth with his men in 851, when tidings came that the Danes had landed not far off at Wembury, and joined, as the Saxon Chronicle says, the men of Devonshire, who "fought against the heathen men, and at Wicganbeorh made great slaughter, and gained the victory."

I give on the next page from the Dictionary of Mons. Viollet le Duc an illustration of a more important place, but which conveys a good idea of what these fortified homes were like. Such was Plympton before Domesday.

When the stark king came into Devonshire, after besieging Exeter, and humbling her in the dust, and speeding on to serve Lydford as he afterwards did the North Country, it is not probable he found any opposition offered him by the dwellers at Plympton, but it is likely that at that time the importance of the position was recognized, and that directions to build one of the many castles then contemplated were given.

The Roman encampment was for the defence of the empire, the Keltic earthwork was for the protection of the tribe; but the aim of the Norman was a more selfish one, security for himself and his estate. "Every man who acquired land sought also to possess a stronghold, from which he might sally forth and win a
subsistence by the aid of horse and arms, or with snaffle, spur, and spear."*

*Domesday* mentions but few castles. But what the Norman understood by a castle at the time of the conquest was something very different from that fortification which he made himself master of, and what is called a castle in *Domesday*. This was the strong square masonry tower, some of which had already been built in England by Normans and Frenchmen, during the reign of the Confessor, no notice being taken of the fortified *aula*, which every

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Norman and almost every soke and large estate had, or the entrenched residences of the ordinary thegns. *

Fortunately for those who then lived in them, the counties of Devon and Cornwall had not many castles within their boundaries, and none were of any considerable importance, or their buildings of any great extent. Perhaps they were not required. The new building was something more than its predecessor. The latter was it is true a strong place, and one for defence, but the former was in every sense of the word a fortress. And it is remarked by one of the chroniclers, † that the English were so easily subdued by the Normans principally through the want of defences of this kind. “For there were very few fortresses, which the French call ‘castles,’ in the English provinces, and for that reason the English, although they were warlike and bold, were yet found to be weak in resisting their enemies.” To the Norman therefore the castle was a necessity. It was one of the objects of the foreigner who had received a grant of land to put himself in the place of his Saxon predecessor, to let it be felt that he was to be looked up to and obeyed; and therefore he would be anxious to locate himself in the very position the English occupied, and to become the centre—military, judicial, and social—of the district over which he ruled. Hence he condescended to punish and redress, and to extend his protection to those beneath him. We therefore find that the Norman castle has an earlier history. But besides this it was necessary to make himself secure; and the care of the Norman lord was to erect such a fortress as he and his ancestors had been accustomed to in Normandy; and in ordinary cases where it was thought inexpedient to adapt the earlier work to the new necessities, a rectangular tower of considerable strength was forthwith built, in which he and his followers could take refuge and defend themselves in case of hostile attack. This was the Norman keep, of which we have many fine examples in England remaining. Sometimes this erection was of small size, sometimes of considerable magnitude, but always of great strength and carefully constructed, no pains being spared to render it as perfect as possible, and all the appliances and knowledge of the skilled builders of the time were brought to bear upon the construction of the keep, with what success many ruins still show. But although the Norman builder preferred, as is evident, a rectangular keep, he was willing if

possible to avail himself of the labours of those who had before occupied the site; and if the earthworks which he found could be made useful in the construction of the new building, they were, I think I may say, invariably used. If therefore he found a mound, or as he would have called it, a "motte," which was of sufficient strength to bear the massive walls of the intended keep, he made his building conform to its shape, and instead of erecting a square tower, the lines of the new stone building taking the place of the wooden one, followed those of the earthwork. And in doing this in England the Norman did just what had been done in the country from whence he came. "Works answering to this description are common in Normandy, as well as all over England. We find them especially in Yorkshire, along the Severn, and upon the borders and more accessible parts of South and Mid Wales. They are rare in Scotland and Ireland, and unusual in France out of Normandy."*

A keep of this kind became different in character from the square or oblong one, which, being more durable and striking to the eye, was preferred.† The latter would be a house as well as a fortress, and be divided into floors; a cellar, with guard-room on the first floor, living apartments on the second, and other rooms over, and furnished with chapel, armoury, well, and garde-robes. But where the existing mound was well settled and strong, and capable of bearing the weight of the stone-work, the ordinary form was discarded for one which corresponded to the form of the mound. In two places in England, Oxford and Saffron-Walden, curiously enough, buildings of both characters are found in one fortress. The round or polygonal keep was what was designated a "shell keep," and such a keep was erected upon the ancient mound at Plympton.

Enough still remains, little as it is, to enable us to compare this building with similar ones, and to ascertain what its general structure and appearance were. The wall is of rubble masonry, built with hard mortar of the strength of cement, about eight feet thick, and rising originally to a height of probably thirty feet, enclosing a circular space of about fifty feet in diameter. The upper part was battlemented, and within the battlements a platform or walk was formed in the thickness of the wall. This may be seen now at Trematon, and, although the work is later, at Totnes. The staircase leading to this was of wood, for although the Normans

preferred stone they did not by any means despise wood, and frequently used it.

This eight feet wall is a comparatively thin one. The Norman walls were often of enormous thickness, sometimes twelve and fourteen feet; those at Colchester are no less than thirty feet thick at the base. At Newcastle it is supposed that the whole of the area of the keep, a very large one, has been built up solid from a depth of about fourteen feet to the surface. The mortar, or grout, was the main-stay of the work; the stones, as may be seen without difficulty, were of no great size—not larger than could be easily lifted by the workmen; those on the face slightly dressed. The middle of the wall seems to be composed of small stones, but so firmly bound together by the mortar, which must have been used in a semi-fluid state, that the stones themselves are little harder than the mortar is now; and it is the same elsewhere. It was thought necessary some little time since to pierce the walls of the White Tower at the Tower of London, and the task occupied a party of sappers and miners six weeks.*

Being a shell keep, the interior of Plympton was not divided into floors, as were those not erected upon mounds. The centre was open to the sky. Arranged around the wall were wooden erections, which contained stores, and the various contrivances and materials for keeping an enemy at bay—stones, pigs of lead, barrels of oil, supplies of lime, and appliances for melting and heating them, and otherwise preparing and rendering them fit for their descent upon the heads of the assailants of the Castle. Similar erections afforded some kind of shelter for the soldiery, but these were only of a temporary nature; for the permanent lodgings or barracks, as they may be termed, were in the court below.

In the thickness of the wall are some apertures, which have caused a considerable amount of speculation as to their probable use. There are two of these apertures, about six feet distant one from another, running entirely through the circumference of the wall. They are as nearly as possible one foot five inches wide by ten inches high. They extend entirely through the existing remains of the wall. The lower one is near the present surface of the ground, within the wall; the second, as I have just said, about six feet above.

These passages have the appearance of having been carefully

plastered with the same mortar as that with which the wall is built. Although they cannot at the present time be said to be open from end to end, I think there is no doubt that they are really so, and that the obstruction in one or two places, which prevents a long rod being passed through, is caused by the deposit of stones, the handiwork of the youth of Plympton.

Connected with these openings are some others, which I may refer to. Running quite through the thickness of the wall, and in some places apparently crossing the others at right angles, are several smaller holes, round in shape, about four inches in diameter, extending from the inside to the outside of the ruin. A mysterious connection between these holes and the larger ones has been assumed; and if one theory could possibly be correct, that the latter were passages for soldiers to and from the different parts of the building, they would certainly be useful in giving the unfortunate traveller a little air in his journey through an opening seventeen inches by ten. The larger holes are also stated to communicate with a secret passage which formerly existed between the Castle and the Priory, in confirmation of which certain Plymptonians will assure you that cats put into one of these holes have been known to turn up at the Priory. Other suggestions are, that the openings were used for sending missiles through—but how this was done has never been explained—as a means of ventilation, and as a kind of speaking tube for transmitting messages from one part of the keep to another. All these explanations are wide of the mark, and there is really no difficulty at all in the matter. The fact is, that these holes were originally filled with timber balks, intended to strengthen and support the wall upon the somewhat uncertain foundation of the mound. This plan was frequently resorted to by the Norman builders, especially when the work was placed upon an artificial foundation; the ties were enclosed in the masonry, the mortar was freely used, and ran down into the interstices, and formed a sort of casing round the timber. In course of time the timber decayed, leaving the hollow spaces as we now see them. Similar cavities have been found elsewhere, and there can be no doubt that this is the explanation. "At Lincoln, when the foundations of some of the Norman work were laid open for repairs, they were found to be worked in with a sort of framework of timber tying the whole together," showing that this mode of construction was adopted as
a precaution, not only in the superstructure as at Plympton, but in other parts of the building. Cavities left by the decay of such ties are to be seen at Rochester, Dinas Powis, and elsewhere. The round holes are as easily accounted for. They are, of course, the "putlog holes," as they are called by builders, being the holes in which were placed the small pieces of wood by which the floor of the scaffolding used in the construction of the building was supported. These were removed, or, perhaps, only cut off close to the wall, and the parts embedded, which have since decayed like the larger ties, allowed to remain.

The foundations of the wall project a little with a set-off. These footings are only to be seen on the outside. Inside, the soil has accumulated to a varying depth of from five to six feet. The greatest height of any portion of the existing wall is eighteen feet on the outside, and twelve feet eight inches inside. This is on the north-east. On the south-east the height is seventeen feet outside, and eleven feet six inches inside. The total circumference of the remaining wall is ninety-nine feet six inches.

I have seen it stated somewhere* that the mound has sunk in the middle, and that this is a confirmation of the story that it is hollow, and that there is a communication with the Priory. This is evidently a variation of the cat story. The Norman is not likely to have placed his keep upon a foundation that was hollow. There is no indication of anything of the kind, the whole surface now being tolerably level.

The entrance to a rectangular keep was usually upon the first or second floor, but in a shell keep the entrance was upon the ground level; that is, the level of the surface of the mound. It is probable that the entrance at Plympton was towards the west, and certainly on the ground level. How the mound was ascended is not very clear; but for some time after the completion of the keep the mode of access would be by steps in the side of the mound; later it is likely that communications were constructed between it and the rest of the new fortress up the ramparts. It is evident, if I am correct in supposing that the antient encampment extended beyond the mound, that the Norman did not use the whole of the space in planning the new fortress. He abandoned the works to the east, and stopped on that side with the mound and the new keep. Whether the antient works did go further or not, it is

very clear that the moat and the mound formed his boundary there, and that there was no wall protecting the Castle on that side.

Having secured his keep, and thus obtained a place of safety from hostile attack, the Norman was in no hurry to complete the other works of the Castle. He had the ditch and the bank and the palisade of the Englishman to protect himself and his followers, and in the event of being driven from these, his stronger keep. In some cases we know that the antient works served as the only protection for half a century or more; and at Plympton, with the exception of the keep, I doubt whether there were any Norman works of importance; that they were not of any great importance is evident. The keep itself was small, not nearly as large as Trematon, and the military architecture of the Norman was so massive and enduring, that if there had been any considerable buildings at Plympton some remains would still indicate their nature. We have nothing to tell us of lofty towers or great gateways; the whole of the work was upon a small scale, and what it was there seems to be no difficulty in ascertaining. Still the earthworks of the conquered are more enduring than the stone defences of the conqueror. While the former remain now almost intact, of the more solid, and apparently much more imperishable structures raised upon them, scarce a trace remains.

There was no necessity for a castle of first-rate character at Plympton. After the successful siege of Exeter, and the destruction of Lydford, the reason for which we know not, the Conqueror appears to have had no opposition of any kind in the West Country. And we find in Domesday that Plympton, at the time of the survey, belonged to the king. The English owner had doubtless lost his possessions in resisting, or at all events in not helping William in his march of conquest.

Before the Conquest we find that there were various divisions of the country, which may be broadly thus described: (1) the township, villata, vicus or tithing, forming the basis of, and now represented by, our town, tithing, or parish; (2) the hundred or wapentake, an aggregation of townships, a division still preserved; and (3) the shire, representing the county.

Between the hundred and the shire,* or more probably side by side with the former, existed large franchises or liberties, jurisdiction in which was vested in private hands. Their origin appears

to have been a grant by the king of a district in which the grantee might exercise all the authority, and possess absolutely all the rights and advantages, which the king himself possessed therein. Many of these liberties were held by the Church, others had been granted to the great thegns and gesiths.

Such a liberty was probably Plympton. Held by a thegn before the Conquest, it fell into the hands of William after that event, and was held by him and his immediate successors as crown land.

When such a liberty became vested in the sovereign it retained its separate existence, free from any exterior jurisdiction. As in the cases mentioned by Mr. Stubbs,* in his *Constitutional History of England*, such estates were either set apart as a provision for the king's ministers, or held by the king himself, the rent being collected by the Royal Exchequer, and they were known by the name of Honours.

Every Honour had a capital seat. That seat was called *Caput Honoris*, or *Baronie*, and it was commonly a castle.†

Among the knights to whom the Conqueror confided the care of Exeter after its capture, in 1068, and by whom the erection of the castle projected by him was to be superintended, was one who had accompanied William from Normandy, fought with him at Hastings, and during the efforts made to establish his new kingdom had been his trusty soldier and well-tried friend.

This was Baldwin of Moeles, de Molines, or de Sap, son of Gilbert Earl of Ewe, whose father was Godfrey, also Earl of Ewe (Eu) or Brion, a natural son of Richard I., Duke of Normandy, grandfather of William. But besides this relationship, there was another tie. It is said, and with some appearance of truth, that Baldwin had married Albreda, William's niece, and had in other ways than as a warrior and at the council, showed his willingness to assist the fortunes of his ambitious relative, and that the marriage of Matilda of Flanders with William was in a great measure brought about by him.

It was therefore but natural that William should amply reward one who had thus served him so well and so long, and extensive

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* Stubbs, "Const. Hist.,” vol. i. p. 401.
† Madox, "Bar. Ang.,” p. 17. Madox says that an Honour was the fee of an earl or baron, and that it must at some time have been such; and he seems to imply that it took its name from being, or having been, vested in an earl.
possessions in the county of Devon were bestowed upon him. In addition to the castle of Exeter, and the custody of the county of Devon, he and his successors were long after styled sheriffs; the honour and barony of Okehampton, and no less than one hundred and fifty-nine Devonshire lordships were assigned him; and his power in the West Country became very great. The list of his possessions in the Exchequer Domesday of Devon fills no less than eleven columns, more than one-seventh of the whole book.

His friends and relatives participated in the rewards heaped upon him, and although his son Richard the Viscount died without issue, in 1137, his lands descended in his line for several generations.

Richard de Redvers, Rivers, or Ripariis, from Reviers, near Creuilli, and afterwards de Vernon, Lord of Nehou, was a younger brother of Baldwin's, but we do not know that he joined the fortunes of William, or that he was ever in England; but his son, also called Richard, we find in the reign of Henry I. high in favour at Court. He was in the first year of the king's reign one of his chief councillors, and obtained from him Tiverton and the Honour and Castle of Plympton. He was soon created Earl of Devon, with the third penny of the Crown rents collected in the county, amounting to £18 annually. Further possessions were given him, and at the time of his death he was seized, besides other extensive possessions, of Christ Church and the Isle of Wight. He had not, however, been able to wean himself from his Norman lordship, and on his death there, in 1107, he was buried in the Abbey of Montebourgh.

It is not at all improbable that Plympton Castle was completed by Richard de Redvers, and that the building, which, as we shall see, lasted but a very short time, was mainly erected by him. It will be convenient to point out here the extent of the Norman castle. We are assisted in this, in some measure, by a representation of the Castle on a seal of its lords. The deed to which the seal is attached is dated 15th James I., and by it Alexander Maynard, of Tavistock, acknowledged the receipt of 25s. from Richard Edgecumbe, Knt., to the use of the lords of the Castle of Plympton, due to them for a relief after the death of Peter Edgecumbe, of the manor of Stonehouse.

The artist has taken some liberties with his subject, but in all probability the seal, which would be of about the date of the deed, but copied from an older one, is intended to indicate only the general features of the building, which I think it does. What we have represented is evidently a portion of the north side of the Castle. The mound with the shell keep is shown very clearly, and is just such a structure as we should expect to find it; the lower mound in front I cannot explain, and it must be, I think, a liberty taken by the artist. The battlemented wall on our right is the curtain wall connecting the keep with the rest of the Castle, and which doubtless covered a staircase leading to the top of the mound.

The loopholes shown indicate the course of the walk. We have next the gateway, which was the principal one, and indeed apparently the only mode of access to the interior of the Castle. You will notice that it is very massive, the size of the tower above being little less than that of the keep tower. Beyond this we have the wall enclosing the bailey, which was erected upon the bank above the ditch. This was continued, apparently without a break, entirely round the bank, until it met the curtain wall again upon the south, which ran up to the keep. On the western side there was an outwork, a barbican, which has been known from time immemorial as the Little Castle. This was connected in some way, probably by a drawbridge, with an entrance in the wall, which of course would be small, and easily closed and defended. Within the enclosure would be the barracks for the soldiers, the dwelling
of the lord and his family, or his representative, the magazine, stores, well, and chapel.

It is evident that we have here a fortress of the simplest character, and therefore of great interest, as I think it shows that the Norman did not think it worth while to interfere with what he found at Plympton; but, considering that the mound, banks, and ditches, might be made available for the altered nature of the fortification, simply placed his stone walls—probably, as no traces remain, slight in their character—upon the earthen rampart, and thus completed his Castle. Indeed, it seems clear that Plympton was a much more important place before the Conquest than it was after.

Richard de Redvers left three sons by Lady Adeliza, daughter of William Peverell, of Nottingham—Baldwin, Earl of Devon, William, surnamed De Vernon, and Robert, of St. Mary Church; and a daughter, Hawisia, who had married William de Romare, Earl of Lincoln.*

The eldest son succeeded to the Earldom. Like his ancestors, Baldwin de Redvers was a warlike, restless, and ambitious man. Besides the Earldom and other possessions of his father, he had obtained, either by gift or inheritance, the castle of Exeter, styling himself in some of his charters, "Earle of Exeter."

Having quarrelled with Stephen (it is said because the king had refused him a manor which he had asked for), he declared for Matilda, and fortifying his castle at Exeter, bid the king defiance. The citizens, peacefully inclined, informed the king of Baldwin's conduct, and invited him to punish the earl. The king, enraged at the news, sent an advanced guard of two hundred horse, and soon after set out himself with his army. Reaching Exeter, he was welcomed by the inhabitants, and immediately laid siege to the castle, in which the earl, confident of its strength and of his power, had shut himself up with his wife and sons, and a strong garrison chosen from the flower of the youth of England, who were bound by oath to resist the king to the last extremity. Perhaps the energy and ability of Stephen were never so conspicuous as during this siege; every device which the military engineering of that day afforded was resorted to to reduce the fortress, but without success, the besieged repulsing every attack with vigour. Baldwin

had not been forgetful of his other possessions, and at Plympton he had left a strong guard to defend the Castle, and the lands and tenants of the Honour and manor there. But those to whom this trust was committed proved faithless, and fearing the ultimate success of the king, and the improbability of Plympton being able to hold out against an army which it seemed probable Exeter would be unable to resist, made overtures to Stephen privately, asking for terms in consideration of the surrender of the Castle. The anonymous author of the Acts of Stephen tells us that "Baldwin's soldiers who were entrusted with the defence of his Castle of Plympton, in despair for their lord, from the accounts they heard of the king's power, and fearing for their own lives, from mere cowardice and want of firmness, privately sent messengers to the king to treat for the surrender of the Castle and make terms for themselves. The king was desirous if possible to crush these disorders without having recourse to arms, and he therefore readily granted all they required, if only they submitted to him and became his peaceable subjects. The agreement being ratified, the king detached two hundred horse with a large body of archers, who early in the morning made their appearance before Plympton, to the great dismay of the inhabitants (comprovincialibus), and especially of those who were not of the faction. The traitors delivered up the Castle to the king's troops on the pretence that they were not strong enough to defend it. It was rased to the ground by the king's command, and Baldwin's domains, which were very extensive in that district, and were fertile and well stocked, were stripped of everything, so that the expedition returned to the king at Exeter with many thousand sheep and cattle. The intelligence spreading through the whole of Devonshire, the other adherents of Baldwin, fearing the loss of their property from the king's expedition, offered their submission, with the exception of Alfred."*

The possessions of Baldwin thus harried by the soldiers of the king extended far beyond the immediate limits of the Castle of Plympton. It would occupy too much time now to endeavour to define accurately the extent of the manor; but I may briefly say that it covered a considerable portion of the present parishes of Plympton St. Mary and St. Maurice, a large part of Plymstock,

especially that adjoining the last-named parish at Elburton, and certain portions of Brixton and Shaugh.

Land such as this must have rendered, as our author says, a rich harvest to the king's followers, and Baldwin's dependents must have suffered severely for their lord's rebellion. From the effect which the fall of Plympton had upon the fortunes of Baldwin, we may conclude that the Castle was considered of great importance. With the exception of Alured, son of Judhael of Totnes, every adherent of Baldwin forsook him, and made peace with the king. Alured set out for Exeter, and by a bold stratagem threw himself into the castle with a strong body of men. We do not know how long the siege actually lasted, but for three months the issue was doubtful. The king had spent in the works of attack 15,000 marks, and in all probability would have been obliged to raise the siege, had not the two wells which supplied the defenders with water failed. The old chronicler rejects all such ideas as that the springs were diverted by the enemy, or had dried up from the extraordinary heat of the season, or from accident; but asserts that the failure arose from a direct mysterious interposition, as immediately after the conclusion of the siege the springs flowed abundantly.

Deprived of water, wine was resorted to by the now hard-pressed garrison, but being obliged to use it not only for drink, but in making their bread and cooking their food, and also to extinguish the fiery missiles which were thrown into the castle by the king's troops, the cellars were soon emptied. It was resolved to treat for the surrender, and, aided by friends in the camp of the king, Baldwin sought to make his peace, but the emaciated appearance of the earl's messengers clearly showed the king and his councillors that in a short time the haughty earl must surrender at discretion, and by the advice of his brother, the Bishop of Winchester, Stephen drove the envoys from his presence without even hearing what they had to propose.

Baldwin's wife, the Lady Adelicia, then ventured to approach the king, and to beseech his clemency for her lord and his men. With ashes on her head, and barefooted, she sought the king's presence, and in an agony of grief supplicated his pardon. Stephen received her graciously, patiently listened to her entreaties, but refused her prayer. The defenders of the castle were now reduced to the direst extremity; but although starvation was inevitable if
resistance was prolonged, they would not submit to an unconditional surrender. And now Baldwin found other advocates.

In the king's camp were many who, although espousing his cause from motives of prudence, and fighting for him, really sympathised with Matilda and her friends. Some of these came to the king, and appealing to his fears as well as to his humanity, succeeded in gaining what the more direct, but no less urgent, importunities of the earl and his lady had failed to obtain. The king—while promising to allow the garrison to quit the castle free men, and with their arms and property, with permission to take service with any lord, and to give Baldwin and his family their liberty—declared the large possessions of the earl forfeit. It is evident that the lack of water alone brought the brave defence of Exeter Castle to a termination; for on the evacuation the only thought of the soldiers was the means of allaying their thirst.

But Baldwin was not humbled by his want of success at Exeter, nor was he weary of battle. Stripped of his estates, and deserted by those who had encouraged him to rebel, he resolved to defy the king again; and getting free from Exeter, he hastened to the Isle of Wight, no longer his, and throwing himself into the castle, announced his intention of holding it against Stephen, and to collect a fleet to be used in intercepting traffic of every kind between England and Normandy. But the king was equal to this emergency. Leaving his army under the command of his brother, the Bishop of Winchester, with a promptitude which Baldwin had not reckoned upon, he reached Southampton, and gave directions for the fitting out of ships to act against the fleet of Baldwin. The earl, astonished at the energy of Stephen, and unprepared for resistance, resolved to take a bold step characteristic of the man. He left his stronghold, and came into the king's camp, and having obtained an audience, making no reference to his late rebellious intentions, demanded to be reinstated in his forfeited possessions. Stephen refused; but fearing, it is supposed, further interference with one who had proved himself so formidable an adversary, and who had so many friends, not only in England, but abroad, contented himself with banishing him the kingdom. Baldwin, compelled to accept his exile, quitted England, and forthwith presented himself at the court of the Empress Matilda and her husband Geoffrey, Count of Anjou, by whom he and his followers were received with every mark of respect.
And now Baldwin spent all his energies in fomenting discord among the king's subjects in Normandy. By representations of the wrongs he had suffered, and aided by Matilda, he succeeded in rallying around him many of the great barons, who placed themselves under his command, and petty warfare of a most harassing kind followed throughout Normandy. In every direction the people were plundered, and suffered from fire and sword; no act of violence or rapine was unpractised. The presence of the king was necessary to subdue this outbreak, and early in Lent, 1137,* he followed envoys he had unwillingly sent, and succeeded in restoring tranquillity, concluding a peace with King Louis VII. of France, his son Eustace doing homage to the French monarch for Normandy as a fief of his crown, and making a truce with the Count of Anjou, to whom he agreed to pay 5,000 marks annually. We do not find that Baldwin profited by these transactions. We may suppose that he remained with the empress steadfast to her cause; but in 1139 we find him again in England. With a brave and reckless band he landed at Wareham, in Dorset, and, doubtless by pre-arrangement with the enemies of the king, was put into possession of Corfe Castle, said by Henry of Huntingdon (from whose and other chronicles I have mainly collected these later particulars) to be one of the strongest places in England. Stephen lost not a moment in besieging the castle; but his efforts to take it were unavailing. After spending much time and treasure in the attempt, he raised the siege, and suffered Baldwin to retain possession. We may suppose that this incursion of Baldwin's was in connection with the landing of Matilda and Robert of Gloucester, which took place soon after, at the end of September, 1139. We next hear of him at the siege of Winchester, which ended in a disastrous rout, resulting in the release of Stephen, and terminating the eight months' reign of Matilda. We have no further account of his deeds, unless he was the Fitz Gilbert who, according to William of Malmesbury and Henry of Huntingdon, while holding the castle of Marlborough for the empress, enticed the ruffian Robert Fitz Hubert thither, and handed him over to Robert of Gloucester, who caused him to be hanged at Devizes. In all probability he was with Henry upon his landing in the winter of 1152. Upon the accession of Henry he was restored to all his possessions and honours, which he

* Henry of Huntingdon.
PLYMPTON CASTLE.

PLYMPTON OASTLE. did not, however, live long to enjoy. We may suppose that it was in the days of his prosperity, before Stephen seized the crown, that the good deeds we have recorded of him were accomplished, churches and monasteries having been founded by him. His pedigree shows that he married Adelicia; but we have no information as to her birth or parentage. He had issue three sons, Richard, Henry, and William, who afterwards succeeded to the earldom; and two daughters, Matilda and Hadewisa. He died June 4th, 1155, only about six months after the accession of Henry, for whom he had suffered so much. He was buried in the church of the monastery of Quarr, in the Isle of Wight, which he had founded, and his eldest son Richard succeeded to his title and estates.

To return to Plympton. We are told, in the only account that we have of the surrender of Plympton, that after the Castle fell into the king's hands it was rased to the ground. I believe that this statement is a correct one of what took place, and that from that period it has always been as it is now, a ruin. We have not, as far as I can ascertain, any reference to it as a place of defence afterwards, although it existed in name, and offices in connection with it continued until within a comparatively recent period. Baldwin De Redvers had no time to rebuild it, and in all probability his son would not have been allowed to, one of the means which Henry relied upon to restore order in the troubled state of the country being the destruction of many of the smaller fortresses, as well as the enormous number of adulterine castles which had sprung into existence during the reign of Stephen. The miseries which these last-mentioned castles were the means of inflicting are incredible, and the accounts given in the Saxon Chronicle and elsewhere of the tortures inflicted therein, and the cruelties practised by their owners, are most pitiful.

As a Norman castle, therefore, I think it is certain that Plympton could have existed but a very short time. The domestic buildings probably lasted on, and were used from time to time, although it is evident no care was bestowed upon them.

With various intervals of forfeiture the Honour and Castle of Plympton remained in the Redvers and Courtenay families until the death of Edward Courtenay, who had been created twelfth Earl of Devon, in 1556, without issue.

In various documents we find references to Plympton in the
forfeitures and re-grants; but in every case where any description is given, the Castle is mentioned as a ruin. Thus in an undated document, but which was doubtless written in 1539, or late in the year before, in the Augmentation Office, we have a list of all the mansions and houses that the king's grace hath by the attainder of the late Lord Marquis, within the county there, belonging to the Earldom of Devonshire, within the circuit of Roger Kynsey, auditor. The late Lord Marquis was of course Henry Courtenay, Earl of Devon and Marquis of Exeter, who suffered death as a traitor, 9th December, 1538, with Lord Montague and Sir Edward Neville.

Plympton is mentioned in this list, and is thus described, "Item at Plympton, a Castell being an honor wherein was many lodgynge, and now utterly decayed; one Thomas Vawterd, constable of the said Castell and bailiff of the manor and hundred, his yearly fee by patent, iiijth. vjs. viijd."

The offices of profit belonging to the castle were kept up, for in 1509 we find that Walter Trelawnye was appointed to be constable of the Castle and manor, and bailiff of the hundred of Plympton in Devon, during pleasure. In 1601, in the manuscript entitled "A true Collection as well of all the King's Majesties offices and fees in any of the Courts of Westminster, as of all the offices and fees of his Majesties honourable household, together with all fees appertaining to captains and soldiers having charge of castles, bulwarks, and fortresses within the realme of England, and likewise the offices and fees of his Highness's honourable houses, parkes, forests, and chases within the said realme," under "Plympton, Constable of Castle and Bailie of hundred," an annual fee of £4 11s. 1d. is set down as being paid.

When Leland visited Plympton he found, he says, "in the inside of the town, a fair large castle and dungeon in it, whereof the walls yet stand but the lodgings within be decayed." Here and there is a mention of the tenure by which some property was held, either of the king or the lords of the Castle. This was the tenure of Castle-guard, a military one, whereby the tenant was bound to guard or repair some specified part of the castle, tower, wall, or gatehouse; a service to be performed either in person or by commutation money as ward silver.* I have never, however,

been able to meet with any original document in which this tenure is referred to.

In a survey taken in 1651 we find Plympton mentioned, and with many more particulars than in any other document, both as to the tenants and the income arising from the honour. It is, "A survey of the Honors of Okehampton and Plympton, with the fee of Weeke St. Mary" (where was a castle the site of which now only is known), "lying and being in the counties of Devon and Cornwall, part of the possessions of Charles Stuarte, the late King, but now settled on Trustees for the use of the Common Wealth; held as of the Manor of East Greenwich, in free and common socage by fealty only. Taken by Edward Hore, George Gentleman, Gabriel Taylor, and George Goodman, and by them returned the 27th day of November, Anno Domini 1651."

The Honour of Plympton is thus described: "All that the Honour of Plympton, lying and being in the County of Devon, of which there is held one hundred and twenty knights' fees, three parts whereof in eight parts equally divided belonged to the late King, unto whom there hath been heretofore paid for garrett money and suite to Court by the free tenants who hold of the said Honor yearly as a quit-rent per annum, £14 2s. 0d. The reliefs arising and growing due within this Honour of Plympton did amount unto communibus annis fifteen pounds, out of which there being deducted five parts in eight, there remained to be paid to the late King p' ann. £v. xii* vj*".

The yearly payment by the burgesses of Plympton reserved by the first charter, granted by Baldwin the seventh earl, continued to be paid by the now-suspended corporation down to the year 1833, to the Earl of Morley, who had become, by purchases from various parties and at various times, the owner of the Castle and lord of the manor of Plympton. At that time however the finances of the borough had become so reduced that the corporation informed the earl that it had no power to keep up the antient payment, and as the legal representative of the lords of Plympton was unable to enforce it, an acknowledgment which had been made uninterruptedly for a period of nearly six hundred years altogether ceased. Everything is gone now except the few remains of the old fortress; the tenures, the annual payments, the manorial customs, are all swept away. A semblance of a court is, I believe, still held; but how different in its character from what those of
former days must have been. With the fall of the Castle in
Stephen's reign it lost all its glory and power; it fell never to
rise again, and with very small exceptions nothing is left to us
now but the earthworks of the English.

Plympton Castle is an antient monument of the greatest value,
and in a wonderful state of preservation. Its perfect state is due
to two causes—first, the absence (at all events for a considerable
period) of any stone or materials of value which might be of use
either to the lord of the manor, or to those to be found in every
neighbourhood who are always on the look-out for anything that
may be obtained, especially without cost, and worked into a build-
ing in course of erection; and secondly, the fact of its having been
for centuries the village green, in the use and enjoyment of which
the inhabitants have, since the demolition of the Castle, acquired
a right now undisputed. The battle of the public was fought for
it by the corporation in former times, when an attempt was made
either to enclose it or to exercise rights over it which interfered
with those of the public. The paths on the top of the banks used
to be, and probably still are, repaired by the waywardens out of
the rates. The seats there were erected by public subscription,
and the fine trees which now adorn the Castle were planted by the
Treby family to beautify the spot. The history of the old town
would furnish many an interesting episode with which the Castle
is connected, and if it was for these associations only, and as a
place of recreation, it must be jealously guarded; but beyond
these, as I have endeavoured to point out, its value as an antient
monument is still greater, and although under the care of the
present noble earl, the lord of the manor, it is probably as safe as
any place can be, something that will ensure its permanent pro-
tection and preservation is required, and the provisions of the bill
of Sir John Lubbock, when passed, should be here applied, as well
as to those other interesting remains which we are fortunate enough
to have in our county.
PLYMOUTH SOUND.
CHART SHOWING CONTOUR LINES OF BOTTOM.
The Contour Lines are in fathoms below low water.

Scale.

J.C. Inglis del.

W. Brendon & Son lith.
PLYMOUTH SOUND—ITS TIDAL CURRENTS.

BY. MR. J. C. INGLIS, C.E.

(Read November 22nd, 1877.)

The waters in Plymouth Sound are continually ebbing and flowing in more or less defined directions and quantities. A general view of these will, it is hoped, be found a not uninteresting study. There are many difficulties in the way, many doubtful points have still to be cleared up, especially bottom currents; points, which from their nature do not affect the navigation of the Sound, and have thus escaped observation, but which are of the first importance in a complete view of the movements of the waters in the Sound. It has been attempted here to give in as few words as possible a general idea of the currents rather than an exact description at any one time.

In accounting for the surface currents at parts, it will be necessary to examine the geography of the bottom of the Sound. In doing this it will be apparent that the interesting nature of Plymouth Sound does not end at the low-water mark. The accompanying map, prepared from the large chart of the Sound, shows this formation. A deep and comparatively narrow trough extends from between Mount Batten and Drake's Island, where it abruptly commences, in the rear of the island and along the Hamoaze as far as Saltash Bridge. Such an excavation or depression in solid rock is very exceptional, and in two places the depth is over twenty fathoms at low-water; viz., at Devil's Point and off Eastern King, the deepest points in the Sound. Before the twenty fathom line in the open channel is reached, we have to go two and a-half miles outside the Breakwater. Such a depression necessarily has a very great influence on the tidal phenomena of the Sound, and indeed is the key to the most important movements which take place. The water flows along it with considerable velocity, more than once impinging on its steep sides, and causing where it does so the
familiar upheaval and eddy as at Devil's Point. It is obvious, from the structure of this basin in solid rock, that it could never have been excavated in this way, and to this extent, by the ordinary attrition due to running water. Some other explanation must be found.

On the Devonshire and Cornish coasts the main outlets of the drainage have a striking similarity: Falmouth, Fowey, Plymouth, Salcombe, and Dartmouth have, when compared, a significant resemblance; Falmouth, Plymouth, and Salcombe especially so. In all we have the contracted exit to the sea guarded by rocky cliffs, and in the rear a rounded gently undulating expanse of country discharging its drainage at this exit. It would seem then, that these harbours all owe their present configuration to the same agency; a fact which renders the explanation of these excavations in rock by direct volcanic or similar action somewhat doubtful. Take for instance the depression at Plymouth; this has all the peculiarities of a true "rock basin," for the narrower and deeper portions occur just in those places where the erosive power of ice would have been greatest, and as the valley opens out the basin shallows. Such excavations on an extensive scale are of frequent occurrence in Scotland, where the whole of the western coast, both above and below the present sea level, owes its configuration entirely to the erosive power of glacier ice.* Whether similar depressions on the south coast of England are the work of ice or not is a question which has yet to be decisively settled. Comparatively little local evidence has so far been obtained on this important subject.†

Evidences of great change in level are abundant on the south coast. Raised beaches and submerged forests are of frequent occurrence, proving that within a comparatively recent date, with the same general contour of coast line, and disposition of land and drainage, there were thirty or more feet of variation in level, above and below the present mean sea mark.

The silting-up of tidal flats, either naturally or artificially, has

* See Chart in "Geikie's Great Ice Age."
greatly altered the aspect of this locality. Old maps show Plymouth a much more insular place than it is at present, and also the creeks to be much more extensive.* Evidence on this was found when in excavating, now many years ago, for the foundations of a house in Union Street, near the boundary between Plymouth and Stonehouse, a full-sized anchor and part of a cable were discovered several feet underground. The inevitable silting process is no doubt going on in the Sound, but at a very slow rate indeed. The immense area of mud bottom, quite two-thirds of the outer area of the Sound, testifies to it; and Mr. Rennie, subsequently Sir John Rennie, in his report advising the construction of the present Breakwater, dated 21st April, 1806, says: “From conversing with pilots and various other intelligent men whom we met at Plymouth, we have reason to believe that the depth of water in the Sound is on the decrease.”

The silting-up of the Sound had long been a matter of considerable anxiety in Sir John Rennie’s time; indeed much more so than at present. Several Acts were passed forbidding vessels from discharging ballast into its waters, and all mining operations which affected the washing down of gravel and sand. The earliest are dated the twenty-third and twenty-seventh years of the reign of Henry VIII., and the sixteenth year of the reign of Queen Elizabeth. Sir John Rennie, dealing with the question of silting-up, in his report says: “And as a sufficient passage” (on the construction of his proposed breakwater, the existing one) “will be left for the tide to flow into and out of the Sound at the western and eastern ends of the great breakwater, its direction will not be turned from the anchoring ground; and no further deposition of silt or mud will take place there than does in its present state, except indeed immediately without and within the Breakwater itself.”

These predictions have been realized as to the silting-up, immediately without and within the Breakwater itself, which continued increasing for two or three years after its completion, but which is now reported to be perfectly stable. No silting-up has been detected as yet over the anchoring ground, although there must be a decrease in the depth by a small amount, which ordinary soundings would not show.†

* Mr. Brooking Rowe, in his paper on “Plympton Castle,” pp. 246, 247, 253, gives singularly clear evidence on the change which has taken place in the Plympton valley.
† Captain Osborne, R.N., on this point remarks, in a letter dated 23rd
Our consideration is more particularly directed on the present occasion to the currents due to the tidal rise and fall of the water, and not to the laws of that rise or fall. Necessarily the currents are entirely regulated by the extent of this rise and fall, which, as we all know, depends in the main on astronomical agencies. The direction and force of the wind influence the height of the tides, and the direction and velocity of the currents, here as elsewhere to a great extent; three or more feet of water have been banked up in the Sound from this cause alone. The pressure of the atmosphere also has its influence, which at this port is very noticeable, possibly from our proximity to the open sea. A low barometer brings in more water, and a high less. Commander Walker, late Queen’s Harbour-Master for this port, a most assiduous, able, and successful observer, has estimated from a long series of observations made at the Dockyard, Devonport, that for every inch of mercury fallen sixteen inches more water is brought in, than would otherwise happen at the same time under the other conditions, and vice versa; sudden changes being accompanied with a difference at the rate of twenty inches.

Thus with the direct action of the wind on the water, the effects of freshes from the Tamar and the Plym, and astronomical and meteorological influences, all more or less varying in intensity, we can understand the exceedingly changeable nature of the tidal currents in the Sound.

The first indication of a rising tide outside the Breakwater is November, 1877, and published in the Western Morning News: “It appears to have been stated that no survey of the Sound has taken place since the Breakwater was built. I beg therefore to inform you that myself and two other officers were employed by the Admiralty, between the years 1856–60, to survey the coast and harbours, &c., between the Start Point and Rame Head, including Plymouth Sound. The latter being so important a place was most carefully examined, and laid down on a large scale. The soundings were taken in parallel lines one hundred feet apart from shore to shore, the sounding-boat being guided by two flags in a line trigonometrically fixed on the shore; the lead-line was marked to feet, used by an experienced seaman, under the eye of officers long accustomed to surveying work, the rise and fall of tide being registered every ten minutes, in order to reduce the soundings to a uniform level. I know the late Queen’s Harbour-master (Commander Walker) had an idea that the Sound was silting-up, and we were aware of its being the general impression; but on comparing the best old charts of the Sound with our careful survey, no proof could be found to establish the fact.”
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from a south-easterly direction; the opposite quarter from which we should naturally look for it. It is true that the tidal wave approaches the coast between the Lizard and the Start, generally speaking, at right angles, as the map of co-tidal lines or the plan of the crests of a tidal wave at each successive hour of its advance up Channel clearly shows.* We must divest our minds of the idea that the direction of a tidal current in the open sea coincides with the direction of progression of a tidal wave. The time of high water at the Eddystone is eighteen minutes earlier than in the Sound, and the currents there begin to change about the time of high-water or low-water in the Sound. The main Channel stream is observed to run on flood tide for three to three and a-half hours after the change at the Eddystone in the direction of the ebb tide. Similarly a flood current, or that which flows in the same direction as the advancing tidal wave, will continue running for the same time after high-water.

A general and simple explanation of this apparently paradoxical fact may be found in the pendulum. During an oscillation the maximum velocity occurs when the pendulum is at its lowest level, and the minimum or no velocity at the half-swing, or half-way between two successive passages over the lowest point. So with the tidal currents in the Channel, the slack-water or no velocity occurs half-way between the crest of one wave and the hollow of another, or half-way between their point of highest and lowest level. We must not forget that when motion is imparted to water its surface of equilibrium is not a horizontal plane, as it is when at rest. We need not therefore be at all surprised from whatever direction the flood stream first makes off Plymouth, even leaving the Eddystone rocks out of the question, which have undoubtedly a great influence on the local channel currents. Numerous tide-linings are seen encircling and extending in a north-westerly and an easterly direction from the Lighthouse, clearly showing that a very considerable interruption takes place, and that it is not entirely caused by the cluster of rocks on which the Lighthouse stands, but mainly by its submerged ramifications extending in various directions.

Whether the current, which makes into the bay from an easterly direction at the commencement of the flood, is a branch of the main channel ebb-stream deflected inshore, or an eddy caused by

* Dr. Whewell's Chart of Co-tidal Lines. Phil. Trans., 1833.
the Eddystone rocks, or the proximity of a strong stream, and to what extent all these influences contribute to its formation—I am unable to say; but early in the flood there is extending from the Lighthouse towards the west of the Sound a tide-lining, showing that a coalition of some sort takes place. The currents about the Lighthouse, as its name indicates, are exceedingly complicated, and very far from being understood, although they have been known so long; and on the present occasion have not the same interest to us as those inside the Breakwater.

The flood tide, then, first sets into Plymouth from a south-east or easterly direction, and may be observed from Penlee Point making fair into Cawsand Bay, round which it sweeps gently, and is soon seen creeping up towards the Bridge, under and past Picklecombe Fort; but as yet the currents are very feeble. A considerable body of water passes into the Sound at the eastern channel, and setting rather against the rocks, just after the establishment of the western stream. At about one and a-half or two hours after low-water on springs the flood has acquired considerable velocity, and runs fair into the Sound from the south, or nearly so. The Breakwater necessarily very much intercepts its progression into the bay, and, as would be the case with any similar obstacle in a stream, the currents opposite its ends are accelerated from one knot outside to something like two or three, while on the seaward face there is an area of confused and involved currents, caused by the sudden stoppage of a strong stream. At either end, on the seaward face, small counter currents are sometimes observed lying inside the line of the Breakwater, evidently eddies caused by the strong stream passing the end of the Breakwater. On the inside of the Breakwater, and at its western end, a very much more important eddy takes place, so much so that we might almost call it a feature in the navigation of the Sound at half-flood tide.

A much larger body of water comes into the Sound through the western channel, and generally at a higher velocity, than through the eastern, which latter current loses much of its strength from impinging on the adjacent rocky coast. The western side of this same stream through the eastern channel spreads out immediately on passing the end of the Breakwater, where it breaks up into uncertain streams along its eastern half. Curiously enough, no important eddy is formed by this eastern stream, at all comparable to the one
formed by the western stream at the opposite end. A considerable part of the eastern stream, surviving the interruptions from the rocks on the east and the Breakwater on the west, makes in a north-west or westerly direction, until, near the New Grounds, or further north, it meets the main stream from the western opening, which flows on the first part of the flood tide, generally in a direction from the Breakwater Lighthouse to Mount Batten. At the point where these streams meet there is an eddy, but it is only one focus of several in a larger one, extending from near the New Grounds to the Fort behind the Breakwater, from the Fort to the Lighthouse, and from the Lighthouse to the New Grounds or beyond, as the strength of the currents and their directions determine. Vessels anchored in the return of this eddy near the Breakwater during strong spring tides, may be seen riding at anchor during a strong south-west wind with their bows pointing to Mount Batten, or further east.

This eddy is also taken advantage of by seamen when going out to sea from Millbay at half-flood tide. Starting from Millbay, they steer almost with the current towards Ravenness Point, and when well inshore at this point put about, and cut diagonally across the main stream flowing through the western channel towards the Beacon on the eastern end of the Breakwater. About half way between Ravenness Point and the Beacon the eddy is met with, and immediately taken advantage of. In a short time, with a strong, favourable current, the Lighthouse is reached. Here comes the tug of war, to round the end; but fortunately this is of short duration, and the seaward face is reached on a strong flood from Millbay with a favourable stream for little short of half the distance. This course is only taken by vessels drawing a small depth of water, and towed by steam.

To return to the western stream. It runs, as mentioned, in the early part of the flood, in a direction from the Breakwater Lighthouse to Mount Batten; but as the tide rises, an increasing body of water can escape into the Hamoaze over the bridge between Drake's Island and Mount Edgecumbe. On the earlier part of the tide the combined west and east stream keeps its body well up to the Mallard, but as the tide grows a large and increasing body of water flows off landwards between Drake's Island and the Mallard. This latter stream is very rapidly diverted, and at Millbay there is a strong, deep current, flowing generally
westwards, and towards the latter half of the tide into Millbay from the direction of the Mallard.

There is little doubt that the current during the first part of the tide is along the deep trough, and it is only when the tide has risen and is discharging a large and increasing body of water on the surface, in a direction nearly at right angles to the deep stream, that we notice the boilings and upheavings in places when we should hardly expect them in this locality. The deep trough is no doubt the main cause of the quiet and rapid change in direction of the large volume of water flowing in a westerly direction, under the Hoe, towards Millbay and Mount Edgcumbe, for even beyond the ladies' bathing-place the stream sets westwards. As this stream flows past Millbay, a "lining" or boiling-up may be seen from the end of Gill's Pier and about forty fathoms distant. Such a disturbance as the above can only be caused by the under-current at times setting against the steep sides of the channel at this point, and thus creating an upward current which, in its approaching the surface, meets the top-current flowing in a different direction, and thus produces the well-known surface disturbance. Fortunately this disturbance only occurs when the currents are strong, for the effects of coming suddenly from a strong current into still water, or a reverse current, are found to be very inconvenient when taking ships into Millbay.

From Millbay on the first of a flood the main stream suddenly sets towards the cottage on Mount Edgcumbe, or right into the bend of the trough, thus following its formation completely. The complications and disturbances arise from three causes. 1. Water projected over a strong under-current in an opposite or different direction. 2. The under-current dragging these top-currents into its own direction. 3. The results of the momentum of a large volume of water, some fifteen or sixteen fathoms deep, on leaving the main stream or impinging against rocks or other obstacles.

We have now reached the area enclosed between the Bridge, the battery on Wilderness Point, Devil's Point, and Eastern King, in following up the flood tide towards the Hamoaze.

When the tide sets towards Ravenness Point, or into the bend of the trough, there is comparatively a small quantity of water flowing over the Bridge from the Channel. There is, however, a distinct current, and when this stream comes in contact with the main western current we have the well-known disturbance on the
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line of the Bridge early in the flood. The line of this disturbance is pushed outwards or inwards according to the relative strength of the opposing currents till, towards the end of the flood, it disappears and is replaced by a strong stream from the sea flowing towards Devil’s Point. The original stream still flows along the deep trough, and we can easily see how it impinges with great force on the rocks opposite the battery on Wilderness Point, causing the great boiling-up at this point all are familiar with. All the commotion, upheaval, and eddies at Devil’s Point thus arise from one cause; viz., the impact of the main trough-current on the rocks at the battery and its consequent reflections.

The top-currents on the latter half of the flood are considerably different from the lower; for the main sets over the Vanguard Rock towards the Battery, evidently deflected by the strong stream flowing over the Bridge. Instead of an opposition of currents, as on the first of the flood, there is on the latter half a coalition; both join quietly and flow onwards towards the Hamoaze. The velocity of these currents is very various, opposite Millbay ranging from one and a-half to three or four knots; so at Devil’s Point and along the Hamoaze quite as far as Keyham. On freshes the velocity of the ebb between Drake’s Island and Millbay is said to sometimes reach five knots per hour.

The rebound of the main stream off Wilderness Point is taken advantage of by pilots in bringing ships into the Hamoaze; for the greatest care must be exercised to clear the strong eddy formed by part of this deflected current. Pilots make for Wilderness Point, where the water surges up, in the boldest manner; in a few yards the vessel will be brought up, and if on the proper swing will glide off towards Mount Wise. If this return is taken on the wrong bow, the vessel will swing round into the eddy in Barnpool. Part of the deflected main stream after impinging under the battery is shot off to Devil’s Point, where it again subdivides, part towards Stonehouse Pool, and part along the rocky shore to Bottle-nose Point, where it again comes in contact with the up stream and is returned, forming the well-known eddy between these two points.

From the time the flood stream leaves Devil’s Point we have not the same interest in it on the present occasion, but the sets at half-tide, or when the currents are strongest, are tolerably well defined by the configuration of the bottom; for instance, the main flood
stream from the Devil’s Point sets for Mount Wise or Mutton Cove, and from this over and along the Rubble Bank, where an eddy is formed. Similarly on an ebb tide the stream is deflected from off the Rubble Bank towards Millbrook Lake; it speedily gathers up, turns, and sets along the Cremyll shore towards the Devil’s Point and the quay wall of the Victualling Yard.

The ebb from the Hamoaze generally continues to run for half-an-hour into the flood, or after low-water; and a little before the last of the ebb on a calm day a tide-lining may be seen extending from off Millbay and Firestone Bay, where the ebb waters are finally overcome. After heavy rains the fresh water is carried on the surface of the salt, and where the top-currents meet, over the Bridge, and between Drake’s Island and Millbay a small wave is the result, as if the fresh water were rolling on the salt. On such occasions the stream will continue flowing outwards for two or two and a-half hours after low-water. On the 26th August, at 2:30 p.m. (low-water for that day 12:20 p.m.), this peculiar white ripple between the fresh and salt water was very strongly marked.

The freshes on the Plym have repelled for some time in a similar manner the advancing flood; sometimes the river water reaches as far round as Millbay before it is checked. The first of the ebb tide from the Hamoaze naturally sets across the Bridge, and continues to do so quietly till, as the level falls, and consequently the area of waterway over the Bridge is reduced to such an extent that the increasing ebb stream cannot be discharged, the whole is deflected and follows the course of the trough.

The above is the course of events on the surface, but undoubtedly the deep trough is occupied by a mass of water moving along its course from the commencement of the ebb stream. This undercurrent, when suddenly deflected, as it is under the Bridge, drags the surface currents more or less into its own direction. Thus, on the currents being well established between the Bridge and Millbay, we have the surface currents suddenly changing and flowing at right angles to their former course without any apparent reason. This sharp turn in the surface current under Mount Edgcumbe and off the Bridge is continually taken advantage of by float-men, who land their rafts with surprising accuracy inside the Pontoon at Millbay, as from the point last mentioned under Mount Edgcumbe the stream sets directly into Millbay, striking the end of the Pontoon and causing a sharp eddy in the outer half of the outer basin.
As we would expect, one result of this is a return current from Millbay along the coast to Bottlenose Point, some twenty or thirty fathoms broad, which barges invariably utilize in going up the Hamoaze on an ebb. In Firestone Bay there is an eddy on the ebb, but none on the flood.

What we have just narrated is the ordinary course of events here on the first part of an ebb, but a singular phenomenon sometimes takes place after a high spring tide which has not hung long on the top. The flood current between Drake's Island and Millbay will continue running for an hour to even an hour and a-half after high-water, and after the ebb current has been well established at Devil's Point, the Bridge, and the Cattewater. At first sight this seems peculiar, but may be explained by the momentum of the great mass of water in the deep channel, which requires some considerable time before all its energy can be absorbed; it is even assisted by the ebb from the Hamoaze flowing over the Bridge, thus deflecting it and providing an outlet; at the same time this current is fed on its rear by the ebb from the Cattewater, part of which always flows along the shore under the Hoe. Necessarily the Bridge soon becomes too contracted to pass this united volume, and about an hour and a half after low-water the whole readjusts itself to its ordinary condition, not however without considerable confusion of currents.

When the ebb stream is first wholly deflected at the Bridge it flows into Millbay, as described; but as the ebb continues, the main stream gradually works round till, in the main channel off Millbay, it has a due easterly direction. Between the southern edge of this stream and Drake's Island an eddy is formed, and extending the length of the island. Ships and boats riding at anchor immediately behind the island may be generally observed during ebb-tide to head towards Mount Edgcumbe; in this position they are in the return stream of the eddy. The ebb stream from the Cattewater sets towards the Breakwater in the main, the inshore or northern half of the stream keeps to the rocks under the Citadel and Hoe* as far as West Hoe Terrace, opposite the eastern end of which it meets the Hamoaze current. These two combine and shoot off generally towards the south end of Jennicliff Bay. A tide-lining is frequently seen along the course of this stream ex-

* For some distance under the Hoe the tide, both on the flood and on the ebb, flows in the same westerly direction; the ladies' bathing-place is situated in this distance.
tending from West Hoe Terrace, or Rusty Anchor, to Jennicliff Bay, and if carefully followed an indentation outwards may be seen over the deep channel or trough; but whether this is the result of the ebb from the Cattewater or of a deep under-current following the trough, it would be difficult to determine.

This combined stream, after absorbing the Cattewater discharge and impinging on Jennicliff Bay, is deflected towards the Breakwater, which it meets obliquely all along its western half, and, deflected again by the Breakwater, is shot out beyond the western end in the direction of its length, soon to be again deflected by the main ebb current through the western channel.

The eastern opening is fed from the spreading out of the currents between Jennicliff Bay and the Breakwater, through which a steady stream flows south at a velocity of one and a quarter to two knots per hour.

The late violent storm (14th October, 1877), from the south and south-west, has again reminded us of the dangers of the deep. The immense value of the Breakwater to the Sound cannot be over-estimated. Previous to its erection during a south-west gale the Sound must have been a desperate place; for owing to its formation the heavy seas from the open Channel would dash with augmented fury against its rocky coasts. Lord Howe declared that Plymouth Sound would some day be the "grave of the British fleet." This prediction was made before the Breakwater was seriously contemplated, and when therefore there was some considerable reason for holding such an opinion. In 1813 the Breakwater first made its appearance above low-water, in 1846 the last stone was laid; and how successfully its object has been accomplished we all know. There is one point however I will refer to, on which considerable difference of opinion exists, and that is, Is the Breakwater high enough? Many seamen affirm that it is not. These opinions are based on the fact that the maximum run or disturbance occurs when the sea clears the Breakwater. At Millbay this observation is forced on the gate-men there, who never attempt to close the gates as long as the sea is running over the Breakwater. I do not think that this disturbance is caused by the volume of water thrown over, but that it so happens the maximum wash coincides with high-water in the Sound. At low-water, or even at half-tide, there is very much more opposition to a heavy swell coming up than at high-water, when the waves are not reduced by friction on the
Sir John Rennie in his report remarks on the height of the Breakwater: "The top should be about ten yards broad, at the level of ten feet above low-water spring tides. It may however on trial be found necessary to carry it higher; but this will be ascertained during the execution of the work, when the effects of the sea on it will be seen, and it may then be carried to such further height as may be found necessary." The top of the Breakwater is built 21 feet above low-water spring tides; 11 feet higher than the height mentioned in the report.

Whether or not the Breakwater is too low, I think that if the statements reported to have been made by the crews of the unfortunate ships wrecked at Plymouth during the late gale are facts, there can be no doubt that the Breakwater Lighthouse is too low, in such a storm. The keepers of this house reported that the lamp was generally enveloped in spray during the storm, and their testimony is only too sadly borne out by the crews, or rather survivors of the crews, of the ill-fated ships. The crew of the ship which stranded near the Lighthouse did not see the light till they had struck the Breakwater, and the captain of the steamer which ran ashore the same night near the Mewstone has a similar report on the invisibility of the light. It seems that he was off Plymouth Sound when the gale overtook him, and being lightly laden, could not keep his vessel head-on to the gale. He then ran in for Plymouth, keeping a look-out for the Breakwater Lighthouse, and not having seen it, on striking the rocks was of opinion that he had taken the coast just under Rame Head. Now in fact he had drifted past, and at no great distance from, the light he so eagerly looked out for. This is a serious matter, although such storms only come once in five, ten, or even twenty years.

At the recent meeting of the British Association, Mr. Townshend, in his paper on the Breakwater, mentioned that during a south-west gale, eight years ago, two concrete blocks, weighing twenty-four tons each, and a limestone block, thirty-five tons, were capsized, and in one tide swept completely over the Breakwater; and in the last gale a ship of twelve hundred tons burthen was swept completely over the mound. These facts ought to give us some conception of the immense tear and wear a breakwater is exposed to, and hence the nature of the defence it affords the Sound. It is not at all surprising, with such seas running on the Breakwater, that there is during storms a very
heavy swell in the Sound, notwithstanding Sir John Rennie's conviction to the contrary.

The only point Sir John Rennie seems to have undervalued in his report is the wash caused by the wind; but it is doubtful, supposing he was alive to its actual extent, if he could have modified his plans very much. I think not. To have made the Breakwater higher would have involved a greater tear and wear at its face, so much so that its stability might have been threatened, and even then it is problematical if the evil would have been materially influenced, not to mention cured; for the large waves and heavy swell roll fair into the bay through the eastern and western channels, and when once inside the Breakwater, are soon augmented by the gale to an inconvenient size. Rough water is particularly objectionable in our anchoring ground from the tugging on the cables and anchors caused by the rolling of the ship; in soft ground the anchors will drag before the chains break, thus making the situation anything but safe.

The ground swell from the open sea is very evident at the Millbay Dock-gates after a great Atlantic storm. Here the water may be seen rushing like a mill-stream, either out or into the inner basin, in periods varying from five minutes to twelve or fourteen minutes; that is to say, from outrush to outrush, or the time of the duration of a rise and fall. These, I presume, are the remains of once gigantic waves worn down, only to be seen at contracted necks such as these gates.

When the present Breakwater was proposed it was the main one of three, hence we find it referred to as the "Great Breakwater" in the preliminary discussion, while the others depended on its effect when completed. Breakwaters from the shore opposite the eastern and western ends were spoken of, also one on the crest of the Bridge from Drake's Island to Mount Edgcumbe for the especial protection of the Hamoaze. This breakwater was discussed and dismissed by Sir John Rennie on account of its dangerous interference with the currents at the entrance to the Hamoaze. No one can doubt that such a barrier on the Bridge would have entirely altered the currents, especially on the latter half of flood tides and the first half of ebb, by causing a perfect deflection of the mass of water, and necessarily an area of disturbance similar to Devil's Point, where more than ordinary caution is necessary to keep from danger during a strong tide. But at present the large and, as the
tide rises, increasing quantity of water flowing over the Bridge soon deflects at any rate a top layer, thus preventing a violent impact of the stream against the steep face of the channel.

I cannot help thinking, however, that a small breakwater on the rocks at the western end of Drake's Island, some two hundred yards long, or in fact till the deep water is reached from the main island in a westerly direction, would be of very great advantage to the Sound in producing a larger and safer anchoring ground for small vessels nearer shore, and less exposed than in the outer anchoring ground. It would also somewhat protect Millbay during a south-west gale, to which it is rather exposed. A similar breakwater on the eastern end of the island would be equally advantageous as a protection from southerly or south-easterly gales; but these have not the same effect on the Sound as a south-west gale. No serious deflection of current need be apprehended from these, as being only in shallow water, a very small quantity of water is deflected.

The wash has a great influence on the extent and quality of beach on the coasts. Plymouth has no exception from these fluctuations, but, like other places, its small beaches vary with the weather. Kingsand beach, one of the best in the Sound, is more exposed than any of the others to easterly winds, and consequently to heavy seas from the open Channel. After a storm the beach will be raised two or three feet; the surface will be covered with fine sand, and a few small pebbles. Day by day this sudden accumulation is carried back during calm weather to its original position under low-water, till at the end of a long spell of fine weather the beach is very much excavated out, and its surface and body composed of rough shingle.

At Kingsand, then, a sandy beach is evidence of rough weather, and a rough one of fine. A storm raises the beach, and a continuation of calm lowers it. The extent of the fluctuation is about five feet. The small beaches under the Hoe behave in a precisely similar manner. On the beach at the steps we have measured a general raising during a night of six inches on an ordinary storm, and the sand appears, as at Kingsand.
THE EARLY COMMERCE OF PLYMOUTH.

BY MR. R. N. WORTH, F.G.S.

(Read November 29th, 1877; February 21st, 1878.)

We may fairly assume that commerce first took her seat on the shores of the Sound far back in pre-historic times. We may indulge in the belief that to these waters, as well as to those of the harbours further west, came the Phœnicians on their quest for tin. We know that the keels of Roman galleys, and the sea-snakes of Northern Vikingr, stemmed these tides and grated upon these shores. And we may feel convinced that these vessels came in peace as well as in war; and that the large Keltic population, of whose existence in this immediate neighbourhood the great cemetery at Mount Batten bears witness, was occupied with something more than the hunting or the fishing needed for the supply of its own wants. But we cannot prove this, and whether Plymouth represents or not the Roman Tamara or the Saxon Tamarworth, it is only when our recorded history has well advanced that we can take up the tale of the commercial fortunes of the chief port of the West.

In all probability—and Domesday affords a very definite basis for the calculation—the populations of the two Suttons did not much, if at all, exceed a hundred souls when the Conqueror took his seat on the English throne. And Leland, who derived his information from local traditions current, and records extant, three centuries and a half since, states that in the reign of Henry II., 1154–1189, Plymouth was "a mene thing as an Inhabitation for fischaris, and after increased by litle and litle." This is confirmed by an interesting series of documents, of which copies remain among the municipal archives.* On an inquisition taken by

* Nearly the whole of this paper is based upon the authority of our municipal records; for permission to inspect which I am indebted to the courtesy of our Town Clerk, Mr. Whiteford. They have been re-examined throughout with this object.
Richard Bowchyn, sheriff of Devon, 11th Edward II. (1318), it was found that the kings of England, before the foundation of the town of Sutton, had a piece of unoccupied ground "juxta" the port of Plymouth, five land-yards long and one land-yard wide; and another piece "in retractæ maris" within the circuits and precincts of the ville of Sutton, six acres in extent, whereon was a certain house of the town at the time of the inquisition, and to which place the people of the town, fishermen and others, were accustomed to resort with their boats to dry their nets and sails, and to expose their fish for sale, paying the king 12d. a year and 1d. on each basket of fish sold.

The object of this inquisition is made clear in a record of the ensuing year. Therein the king recites this finding, and declares his intention of making Sutton a free borough, and its inhabitants free burgesses. However, as the Prior of Plympton, with John de Vautort of Modeton, and John de Vautort of Clyst, object to this, the king directs enquiry to be made into their objections. And they declare, in the quaint Norman-French of the record, that our lord the king "ne doit grante a les gents resseaumis en la ville de Sutton par sa charter que euz soient frankeis burgeis"—that the king ought not to make the inhabitants of the town of Sutton free burgesses by his charter; that the fair and market by royal charter belong to the Prior; and that the king has no property in the town. Furthermore, they aver that while the Prior is lord of two parts of the town, the Valletorts are lords of the other third; and that the Abbot of Buckland holds the hundred of Roborough, within which the town is. So they unite in praying the king and his Council neither to grant franchise nor any other thing in the said town.

But we are not hence to assume that the residents of Sutton were entirely without municipal rights. Much earlier than this there is evidence that something of a corporate character had arisen within the ville, probably a development of one of the guilds which played so important a part in the municipal history of the middle ages. In 1310 Richard the Tanner, without doubt an eminent tradesman of his day, was prepositus, or head-man of Sutton, a title correspondent in fact to that of the Saxon portreeve, or its Norman equivalent—mayor. He is the first mentioned as holding that high and honourable post, but it is unlikely that he had no predecessors in office. Plympton possessed mayors under
charter of the Redverses from 1241, and Plymouth was now rapidly shooting ahead of its elder sister. Indeed the bailiffs and commonalty of Plymouth are mentioned as preparing a ship for the king's service as early as 1289.

Be this as it may, in the year 1311 (a market having been first granted circa 1253), Matthew, the Prior of Plympton, let to the Burgess of Sutton eighteen market stalls, which were in a certain place in the said ville adjoining a stone cross, at the rent of one penny per stall per year. Richard the Tanner acted for the burgesses, and affixed his seal to the deed, the commonalty not possessing any. From then until now, five centuries and a-half, in one form or another, market jurisdiction has been exercised in Plymouth by the municipal authorities.

The growth of Plymouth during the early years of the fourteenth century, must have been marvellously rapid; and I question whether any port in the kingdom made such enormous strides. The evidence of this progress is most conclusive, and of every possible kind. In 1311 an Act of Parliament declared Plympton, Modbury (representing the trade of the Erme), Newton Ferrers, and Yalmouth, to be members of the port of Sutton. But for many years afterwards, certainly down through the reign of Edward III., the customer of the "river of Tamar" had his residence at Saltash, whereof Plymouth was originally a member. Fowey was then the head port of Cornwall, a position which Plymouth subsequently took; and in the closing years of the fourteenth, and opening years of the fifteenth centuries, we find Plymouth and Fowey most intimately associated, the same controllers and customers commonly acting for both, the latter chiefly selected from the merchants of the ports. There are among our fifteenth-century collectors—William Bentley, Richard Denzell, John Cory, John Cokworthy, John Serle, Thomas Pilkington, T. Treffry, John Scott, Vincent Pittelesden, William Spenser, Dionis Bampton, W. Hertiside, Thomas Tregaye, Walter Copleston, Peter Carnewell; and among the controllers William Santon, Richard Weye, and John Pylle.

Of the great importance of the commerce of both ports in these early days there is the strongest evidence in the contingents which each furnished to the famous siege of Calais, in 1346. Fowey sent more ships than any other port in the kingdom—47, with 770 men; Yarmouth came next; then Dartmouth, with 31 ships, and 757 men; and then Plymouth, with 26 ships, and 603 men;
while Millbrook, Hooe, and Yealm sent 5 ships, with 83 men. London sent 25 ships, and Bristol only 22.

We also find, from the year 1289 downwards, a number of writs addressed by the Crown to the bailiffs and commonalty of Plymouth, in reference to maritime affairs, which continue at frequent intervals throughout the fourteenth century. The first of these writs was to direct the bailiffs to prepare a ship to transport men-at-arms and horses on service. They replied that they had prepared the Michell, of Plymouth, and she is the first Plymouth vessel recorded in history.

The well-known fact that Plymouth was the headquarters of the operations of the Black Prince against France is a military matter, and does not now concern us, beyond its testimony to the importance of a port in which over three hundred ships could be fitted out for an expedition. This indeed was the case here as early as 1287. It was whilst he was at Plymouth that the Black Prince was created the first Duke of Cornwall, and invested with those rights of fundus and foreshore which have so sorely vexed commercial enterprise in these latter days, and have given the Duchy of Cornwall an abiding interest in the commercial fortunes of our town. Plymouth, however, had been in some sense an appanage of the ancient Cornish earldom; for there is a record that in 1334 Thomas de Spokenton took the water and port of Sutton, with all the customs and dues, except chattels forfeited at the suit of the lord, wreck of sea, prisage of wine, etc., of the honour and castle of Trematon, to be held in convention at the rent of £17 10s.; which may represent between £300 and £400 of our present money.

In the opening years of this fourteenth century Plymouth had an active trade with France. It was to Sutton that, in the years 1317–18, the glass for glazing the Lady Chapel at Exeter Cathedral was brought from Rouen. Corn and wine were among the chief items of import, then as now. In 1360 royal permission was given to the merchants of Plymouth to trade with Portugal: and Richard II. granted a scale of customs to the "mayor and bailiffs, honest men and commonalty," for the purpose of fortifying the town, which enumerates among the articles of trade, wine, honey, mead, cloth, linen, canvas, skins, hake, pilchards, salt, coals, herrings, iron, cheese, soap, wax, corn, boards, pitch and tar, slates, tiles, hemp, and cord; besides dues on fishing boats of 12d. a year;
on ships 6d. "if bearing batell or cokett," 4d. if not; and on brewhouses of 1d. annually. And so in the same reign we find something like a bonded warehouse established, Parliament declaring that merchants and mariners coming "to a place called Conners, in the island of St. Nicholas, shall not pay any duties on their merchandise unless it is exposed for sale."

But the best proof of the extent of the trade of Plymouth—for on its trade its population depended—in these early days is afforded by the Subsidy Roll of 1377. In that year Plymouth contained 4837 persons liable to the poll tax of 4d. per head; that is, of persons above fourteen, excluding "true real mendicants." The total population of the town must therefore have been upwards of 7000, and it must have ranked next to London, York, and Bristol. Its contribution was £80 12s. 4d.; while Exeter paid but £26, having only a taxable population of 1560. Dartmouth paid merely £8 8s. 8d., having but 506. The contribution of Exeter is rather in excess of its numerical ratio, because it had more beneficed clergymen than Plymouth, and they had the privilege of setting a good example to their flocks by paying 1s.

So much for size, now for wealth. This we may infer from the returns of the tenths and fifteenths. These were taxes on moveables, tenths being levied on the clergy, cities, and boroughs, and fifteenths in the rural districts. Originally, no doubt, intended to be an approximate sum, a tenth and fifteenth became in time a conventional equivalent for a fixed contribution of about £39,000, and was levied accordingly. In 1374, the nearest levy to the poll tax quoted, Devon raised as its share of this impost £953 15s. Of this Plymouth seems to have paid £34 12s. 8d., and may therefore be estimated as having contained a thirtieth of the chattel wealth of the whole county. But when to this we add the value of its shipping, we see that it must have been well-to-do indeed. My figures for the tenth and fifteenth are derived from an entry in the Municipal Records, circa 1537, which states that the town had only been in the habit of paying £22 12s. 8d., £12 having been deducted from its assessment. The whole amount was then demanded.

Soon after the date of this Subsidy Roll the prosperity of the town seems to have received a sudden check. Probably the descents of the French had something to do with this, and notably the raid of the Bretons in 1403, when we are told that the town was spoiled and six hundred houses burnt. There must
however have been some continuing cause at work; for when, in 1464, the Corporation petitioned for the reduction of the rent which they paid the Priors of Plympton, they piteously declared "the Boroughe and towne is fallen into great ruyne and decaye, and so like to contynewe in decaye, if that the same Boroughe and towne be not shortlie relieued or otherwise puided for." And then they go on to cite the "great and intollerable charges and coste, as well by the adventure of the sea and otherwise, by the Inhabitants of the same Boroughe and towne sustayned within these few yeres, to the valew of Tenn thousand pounde and above, as the great and intollerable charge that the said Mayr and Coyaltie and their Successors have had in tymes past, and hereafter shall have, and be putt vnto, for the yerelie mayntenaunce and safeguard of the said Boroughe and Towne, and the port of the same, wch is one of the most principall and fayrest ports at this tyme within this Realme, and the kaye and onlie defence of all the Covntrie therto adioynyn, and necessarie to be kept and mayntayned as well in tyme of peace as of warre."

However in 16th Henry VI., 1437, as appears by an old customs book of Plymouth in the Public Record Office, the oldest preserved, sixty-five cargoes were imported into Plymouth. Guienne, Landerneau, Brest, Guerrande, Oporto, Lisbon, Norway, Denmark, Holland, Genoa, Dusant or Dufant, and Spruce, each sent ships hither; and London, Dartmouth, Guernsey, Exmouth, Fowey, and Exeter among home ports. The local vessels mentioned are—the George, Mary, Catherine, Antony, Margaret, and Christopher of Plymouth; the Julian and Richard of Stonehouse; the Christopher of Millbrook; the Margaret of Yalmouth; the Catherine, Thomas, and Mary of Landulph; the Richard, Christopher, and James of Saltash; and these sixteen ships brought twenty-eight cargoes. The leading local merchants were—Robert Folthym, John Nigholls, John De La Lande, Thomas Hoker, William Pollard, Walter Clovelly, Stephen Chapman, Peryn Thomas, John Shippeley, Thomas Bythman, John Pagnell, Walter Facey, Thomas Gille, John Martyn, Thomas Pyppe, John Seeley, John Halbye, John Facey, T. Glede, Thomas Smyth, Fardell, Thyche, Caskes, and Hall. In 1450 too the customs of Plymouth and Fowey contributed £40 a year to the "despences" of the Royal household; Exeter and Dartmouth, £50; Bristol figured for £266 13s. 4d.; and Hull for £400.
And now let us turn for a while to the trade of the town in its internal relations. The fisheries of the village of Sutton were the first occupation of its inhabitants, and the fishing rights chiefly belonged to the Priory of Plympton, partly by gift from the Valletorts. Ralph de Valletort also gave the monks land whereon to erect a milldam, at what is still, from the mills then built, called Millbay. The Valletorts and the Priors between them exercised the usual manorial powers. The Priors were also strong enough to rescue some of their customary rights in Sutton Pool from the strong grasp of the Duchy of Cornwall—not, it is true, without difficulty—and in these, as in others, have been succeeded by the Corporation. The fact that Richard the Tanner was one of the leading men of Plymouth in the opening years of the fourteenth century proves that tanning was one of the principal trades then carried on here; and thinly-scattered over various ancient documents are a few other hints of the same kind, that are not without their value. Thus, in 1397, John the Wimpler is a witness to a grant of an acre and a half of land by Martock's Well to one Margaret Stilman. This grant is from John, Prior of Plympton, who also grants to Ade Blogge and Isabella, his wife, a tenement on "le hill" in Sutton Prior, east of the stalls and south of the pillory; that is, very much where the Free Library now stands. In the previous reign the same Prior grants a tenement in Billabiri Street to William the Spicer and his wife. So early as 1486 Plymouth had one "Jamys" the goldsmith, who was capable of mending "rystaffer ys mace," and "John Gele ys mace." These maces, by the way, came to repair so frequently that I think the mayor must have used them to keep order with. But when in the previous year the town standards were a-making, "y° stanyer of totnys" had to be paid for "y° taynyng" at 6s. 8d. each, while for staining the great banner he had 20d. However one is glad to know that the town even then had in William Seyet, "y° westment maker," a man capable of "frangyng off y° gret stremer," though he only had 2s. 4d. for the work. Just ten years later (1487–8) Symon Artour was entrusted with the making of two "quyshen clothys for Mr. Mayer ys pew wt ye towne ys armys vppon ym." They were made of "goteyskynnes," filled with flocks and adorned with gold foil. In the same year William Stayner, the earliest recorded Plymouth artist, had 1s. for painting the town arms on the town book. But in 1506–7 Nicholas Adams had to be fetched from Looe.
THE EARLY COMMERCE OF PLYMOUTH.

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to make the "crosse and the vanys on the stypell." There is
frequent mention made in the early accounts of the town weights
and measures, and the charges for keeping the king's beam.

You all know that in 1439-40 an Act of Parliament was passed
which definitely enfranchised the whole of what was known as
Plymouth, and brought Sutton Prior, Sutton Valletort, and Sutton
Ralf under one government. It must be always borne in mind
that this did not so much create a new corporation, as it extended
the area and powers of a corporation of some sort already existing.
Thus what Edward II. had proposed to do, moved thereto doubt-
less by the inhabitants, Henry VI. and his parliament effected,
and the domination of the Priory of Plympton, which on the
whole appears to have been of the paternal order, came to an end.
I fancy neither Priory nor town was sorry, for Plymouth must
have been rather a formidable child for Plympton St. Mary, aye,
and Plympton Erle to boot, to manage. At any rate the Act-
Charter was passed, and in the following year the mills, lands,
markets, courts, and fairs, and in fact the manorial rights generally
of the monks of Plympton in Sutton Prior, were transferred to
the mayor and commonalty in consideration of a rental of £41 a
year to the Prior and 10 marks annually to the Prior of Bath.
This was reduced, in consequence of the "poverty and dekaye"
of the town, to £29 6s. 8d. in 1464, and continued at that rate
until the dissolution of the Priory, when Henry VIII. released the
townsfolk altogether. The royal fee farm rent, originally 40s.,
then £1 13s. 4d., continued to be paid, until it was extinguished
by a payment of £40 to Mr. Latham, its then owner, in 1875.

Very few have any adequate idea of the powers of a mediæval
corporation, and the authority of a mediæval mayor. It is clear from
our own municipal records that, save in great matters of imperial
concern, Plymouth, like most other boroughs of this period, was
in all essential respects a little republic, governed by an oligarchy,
who went by the name of the "twelve and twenty-four," and at
the head of whom was a mayor, whose authority was almost as
great and mysterious as that of a Venetian doge. The best that
could happen to an offender was to be left to the mayor's dis-
cretion. I am not quite sure that his worship could hang any
body, though there certainly are entries of persons being disposed
of in that fashion here without the authority being very clearly
stated. However, "Maister Mayor" could banish an offender as
easily as lock one up; and what with prison, pillory, whipping-post, stocks, and cucking stool, had plenty of ways and means of making his will obeyed. He was not only the president of the free burgesses of the municipality, but he was also the direct representative of the Crown, and to him royal letters and mandates were sent, involving at times no little charge. Moreover, he issued passports, and I have a copy of one in which William Thyckpeny, on the 16th of March, 1492, in choice mediæval Latin, bespeaks for one John Cropp peaceable passage, without being vexed or troubled, in his journey to visit divers shrines—to wit, that of the blood of Christ at Haylys, “San Johem in priæ de Scotland,” the blessed Virgin of Walsingham, St. Thomas of Canterbury, thence to transact certain business, and then to return by “Beatem Regem Henry ap† Wyndsore” (Henry VI.) to Plymouth.

Here is an order made by his worship circa 1450, which shows the strict local police of those days:

Maister mayer chargyth and comaundyth yn our sourayng lord the kings be halffe that all man of stranges resortyng to this towne bere no wapyn swerd byll gleyys or other wapyng vppon the forfayture of the same wapyng and there bodys to pson and ffyn and Ransom to the Kyng. And also that none of then habytance of this said towne wtoute the mair ys comaundement were no wapyn vppon the forfayture of the same excepte siamautes and constables or suche as be assigned thereto by the mayr or suche officer as ben wryn the said towne for oure said souraigne lard the kyng.

Itm that eury strang loged wryn the said towne be atte his loggyg sone vppon vij or viij atte clocke att leste. And thake vppon theyme to loge eny pson or psions butte as they wolle answer for theyr goode beryng.

Itm that no vacabundes or travyling men or beggers passing thorowe the contray a byde here ovyr a day and a nyght vppon the payne of ympsonment © and theyr hosts to answer yn lyke wyse for the same. And also that all man of ytylers wtyn this said towne sell theyr vytal payn of forfayto† of the same as well yn brede, filesch, fflyahe, wyne, ale, Eggs butt† chese and all other vytail so that eury pson as well strangrs as other maybe resonably yntretyd.

And also that eury pson loged yn the schypps a nyght take theyr loggyng ther be tymes by the our afsaid.

And also that no pson nor psions wryn this said towne take vppon hym tobe owte of his house ovyr viij atte clocke excepte oflysers or wachemen by the maire there to assigned.

And god save the king and send vs pease.

So, too, the mayor was general of the town by land and sea, which involved in those days more serious duties than the honorary colonelship of volunteers. The townsfolk were charged with the
defence of the port against the enemy. They had to build the fortifications, find the guns, keep watch, and man the bulwarks; and this proved the heaviest burden upon their resources, although, as already stated, certain dues on the commerce of the port were granted them for that purpose. The natural result of all this power and dignity was, that occasionally such corporations as that of Plymouth carried matters with a very high hand, though we do not find this town going to the lengths which proved the ruin of Fowey. That little port actually had the impertinence—we may as well add the pluck—to continue a war with France when the king had concluded peace. And before this it had thrashed the fleet of the Cinque Ports rather than strike sail to do them honour.

Save and except the national regulations affecting the import and export of merchandise, the trade and commerce of the port in the fifteenth and sixteenth centuries were entirely under the control of the Corporation, and to a great extent remained so during the seventeenth century and part, at least, of the eighteenth. No man or woman could carry on any trade within the liberties of the borough unless they were free, and even then the way in which their trade should be conducted was prescribed in all strictness. From the brewing of beer to the building of the church steeple, from the regulation of fishwomen to the sustentation of a guild, nothing came amiss to the "twelve and twenty-four" of Plymouth. Hence the early municipal, ecclesiastical, and commercial history of the town are mixed up together in such a way that it is impossible to deal with one and not touch upon the others.

There is reference to a guild of merchants here under the reign of Richard II.; but whether that continued to exist or not, we find the guild of our Lady and St. George, and the guild or fraternity of Corpus Christi, flourishing widely in the fifteenth century. In 1474 an order was made that no man should be free unless he were a whole or half-brother of our Lady and St. George's guild; and payment to the guild of Corpus Christi appears as a condition of the charter granted to the tailors of the town—the "liberty of the tailors' craft"—the only document of the kind now extant; issued in 1479–80, just four centuries ago.

Be hit knowen to all mant of people that we Will™ Rogger mayer of the Burgh of plymouthe, Thomas Tresawell Recorder of the same Thomas byne Will™ Nicoll John paynter Will™ Thikpeny peryn Erle, with other moo
com burges of the same burghe with all the comens of the same burghe haue geuen and g*unten vnto the brethern and Crafte of Tayllors of the same Burghe full auctorite and power to electe chese and make masters of theyre occupacon and Crafte, and they so made and chosen by theym of the same occupacon and shall haue full auctoritee and power to rule and Correcte all things belonging to the said occupacon and crafte so ffyxte made and stablyshed. They shall make or cause to be made at the cost and charge of the said Crafte a pagent yearly vnto Corpus Xri Ilde for the welthe and profitt of the said Ilde on Corpus Xri day. And the same they shall kepe and maynteyn for ewr at their Coste and charge for the which pagent the said bretherdyn may be prayed for euer in the same Ilde. And on that yf there be any man of the same occupacon in the same towne not keping household that then he or they so being in the said towne not keping household shalbe noon of the said occupacon but that he or they shall make fyne with us the said mayer and Comons And also with the said occupacon and Crafte after the order and discretion of men of the said Crafte by the ou'sight of the said mayer. And yf the said wardens and Crafte amytte any man to be oon of the said occupacon and Crafte. And he happyn to destroye or marre any man of garment for lacke of vnderstandyng, and non cunningyn yn that behalfe, that then he or they so hurted or greved shall warne the master or masters of the same occupacon thereof, and then the said masters of the same occupacon shall paye and contente for the garment or garments so destroyed as hit can be thought reasonable for the same hurte, hauing a recompense of the same pson or psions.

Provided alway by this psents that the said masters and Crafte and euty pson of the same shal be ordered ruled and gou'ned by the mayer of the said burghe for the tyme being in euty thing according to the lbyte and fourme of the said Towne and burghe as any oder of the inhitaunts there being this g'tunte not withstonding.

Note here, that in spite of its monopoly, this charter differs in one very material particular from the regulations of our modern trades' unions—it does secure that there shall be good workmanship.

Nor are the other regulations which I have to quote, and which are of about the same date, by any means altogether to be condemned.

The Mayor comaundith in the king's name of England that all maner of Bakers make good brede and of good corne and holosome for man's bodye, and that they make a loffe for a peny ij loffes for a peny and iiiij loffes for a peny, and that yo brede kepe weight att the first tyme vpon payne of a grevous am'cemt and the second tyme a grevouser am'diament and the third faulte a payne of the pillorie and to forfaite their Bread and their bodie to prison and there to make or fyne att the Mayor's will.

Also that all manner Brewers make good ale and of good malte holosome for man's bodye, and that they sell a gallon of the best in the keve for 14 and q., and when it is cleare and stale in the Barrell for 140b. And of the second ale in the kyve for iij farthings, and when it is cleare and stale
in the Barrell for 14, and that they sell no ale by wyne measure but onlye by ale measure and sealed. And that they sell none till the Ale Taster have tasted it, and so that it be good holosome and able for man's bodye. And that no manner of Brewster neither hoggester sell none ale till they have sett out their signe on payne of forfeiture of all together and their bodies to prison there to make a fyne and Raunsonne at the Mayor's will.

Also that no man these men sell no corrupt wynes neyther reboyled wynes, neither melted wynes ne no other but it be good and wholsome for man's bodie, neither sett two prices on one pype hoggeshed or toun to raise the price that is to saie first for iiiijd and after for vj4 on payne, &c.

[Then the butchers were only to sell wholesome meat—"no Bulls flesh, no Ramms flesh, no Cows flesh that be an Calfe and the Calf be quicke." They were also to bring "their kidneys in their muttons and their skynnes of all manner of flesh to markett," and were not to make any filth in the shambles. Linen and woollen cloth were only to be sold by measures tested by the King's standard in the Guildhall; and the only weights to be used were those of Winchester standard.]

Also that no hostler ne any other man oste no vacabunds neyther anye other man passing two dayes and two nights, but he be a man of knowledge and whence he came and whether he will and where his busiennes be in Toune, and that no man walk vp and downe working daies to ale and to wyne but he be a man lyvelichoode a m'chaunt other wayting vpon any gentleman, on payne of ymprisonmt of theire bodies and a grevous fyne to be att the Mayo's will for it is suspicious.

Also that no hosteler nor Taverner by color of their Taverne or hosterie suffer anye suspetious people of theire lyving to ryott accompanny or lodge together as man and a woman but he knowe verielie that it be a man and his wief, and that no Tav'ner keepe in his house harlote neyther strumpett, but voyde her awaie hastelie on payne of a grevous am'ciament.

[No man to forestall before all victuals were in the market; none to regrate "before the towne be full served." No fish to be bought in boats, but all to be landed, "and that everie man haue a parte thereof that is present att the buying of the same pounde and pounde if it like them."]

Every freeman of this borough, among other things, swore—these were days when swearing was officially habitual—"You shall avow noe forraigner's goods as your own goods, nor buy and bargain with any forraigner or stranger in your own name to yuse, behoof, and profit of another forraigner and stranger, whereby any Custom or duety may be lost or withdrawn from ye Mayor and Commons of this Burrough. You shall take noe apprentice for less than seven yeares, and within that tyme you shall see them taught and Instructed of some honest mystery, craft, or occupation. And If you shall hereafter know any forraigners, merchants, or handycrafts men that shall use to buy, or sell, or practice any craft continually within this Burrough, not being free of the same, you
shall then give warning thereof until the Mayor of this Burrough for the tyme being or his officers." Freemen paid 6d. a year as freedom money, and payments were exacted from inhabitants who were not free. In 1566 a hundred such paid £4 2s. 11d. Apprentices, whether male or female, were bound before the Mayor and duly entered in the books of the Corporation. I have seen records of apprenticeships of girls extending over so long a period as fifteen years.

The Receivers' accounts of this borough contain a quantity of curious information, and not the least curious is that which relates to our present subject. The accounts are by no means complete, but they commence definitely so far back as 1486—not, as Mr. Henry Woolcombe has endorsed the volume, 1446. The chief sources of the town revenue then were rents, custom, the mills, the pound, the market, alewyts, and rollerage; we also find in subsequent years, tonnage, landleave, rollage and package, and wynewyts; and the total ordinary receipts averaged between £50 and £60 a year. Most of these items explain themselves. The town custom refers to the scale of dues granted by Richard II., already noticed. Tonnage was a payment of 1d. per ton by ships which came within the Cawsey, of which more anon. Landleave was simply landing dues; rollage and package was paid, as we subsequently learn, by brewers, and had, I suspect, something to do with the landing, &c., of casks. Ale and winewyts were the dues paid by the drinking houses within the borough. There does not seem to have been any restriction on their number, but from each a small payment was exacted.

There were a few miscellaneous sources of revenue. Thus Thomas Tresawell, in 1483, received for "dawnsyng money of Agnes Dowster of Katon hoker, xis.; Johne, sruant of Thomas Groype, xis.; Jonett potter, ixs. ixd.;" while "Johna filia Will Nycoll" and Roger Payne are set down without any amounts being entered. What this dancing money was paid for, and why it was paid, may be doubtful, but it is very clear what use it was put to. It went towards the erection of "Seynt John ys Ille yn Seynt Andrawe ys churche;" so I hope it was properly come by. To me there seems something in the entry of a dubious character.

Another item of receipt was the money paid for the use of the town carriers or barges—lighters—of which there were two, a great and a small, though neither could have been very big, as an old
one sold, in 1494-5, for 20s. These boats were lent out. In 1487
the charge was 8d. a time for the little boat, and 16d. for the big
one; and they were hired in that year not only by merchants of
the town—John Ilcombe, William Rogger, Thomas Yogge, John
Gew, Thomas Grayson, Thomas Crapp, Richard Bovey, Thomas
Bull, Janet Elwin, William Dawe, William Nycoll, and John
Perse, but by the "Prior of the White Friars," a Frenchman, and
"the owners of the brokyn shypp." One John Adryan had charge
of the carriers. In 1493 the charge was 6d. a tide, but the carriers
do not seem to have been profitable, judging from the entry of one
year's expenses; and they soon disappear from the accounts.

There is one record of the rents of the town property accidentally
preserved for the year commencing Michaelmas, 6th Henry VII.
(1491). It contains 156 entries, including 14 of the shambles.
The total rents in that year were £23 13s. 7d. For the shambles
£4 11s. 8d. were paid. William Bold, Robert Warweke, Richard
Gue, William Joseph, William Chapyn, and Robert Ayer, rented
in the "Shamell" at 8s.; in the "other part" of the Shamell,
Matthew Chapyn, 7s.; Gelam Bocher, 6s. 8d.; Richard Drap,
John Moysen, Robert Hore, Roger Joseph and Thomas, at 4s. The
Guildhall Shamell made 10s.

However, the chief value of this rent roll is the proof it gives of
what has been a much-disputed point—the existence of a house of
Black Friars in Plymouth. There is an entry of the payment of
2s. by the "Dom* psbiterus;" and of 2s. 4d. by the "Custod.
Dom* Eleosinar;" and these entries therefore settle the point
beyond all question.

The Cawsey is mentioned as existing in the very earliest accounts
we have. It is worthy of special note as the first structural pro-
vision of which there is any record, for the accommodation of the
trade of the port. The various entries concerning it, when put
together, show clearly that it was a little pier at the mouth of
Sutton Pool, near the site of the present Barbican Pier, and per-
haps occupying almost precisely that position. In 1487 no less
than £5 16s. was spent upon the Cawsey. Twenty boat-loads of
stones are charged for, and eleven large stones, called "sling
stones," some of which are specified as being intended for within
and others for without the Cawsey. There are frequent entries of
this kind, and indeed the Cawsey was continually demanding
repair.
Leland states "The mouth of the gulph wherein the shippes of Plymouth lyith is wauelled on eche side, and chained over in tyme of necessite."

And so in 1493-4 we find 8d. charged for "Bryngyng of the cheynes from the Cawse yn to the Castell." But chains did not form the only defence. In 1456 2d. were paid for mending the "mast at the Caws;" and in 1496-7 eleven pounds of ironwork are charged for, for the "maste at Caws." In 1511-12 a new house was put up at the Cawsey, and a chaine of iron bought therefor, weighing "viij. C. j. quart. viij. lb., at (j.d. qr.) the lb., iiiij* xvij* j*" Mention is likewise made in this year of a new Cawse, and "grete stones" being brought there. John the mason and Edward Salerman (sailor-man) had 9d. for working three tides at the Cawsey. In 1508-9 it had been "pynnéd and poyned" by "Newcomb the mason and his fellows." In 1511-12 the expenditure on the Cawse and the "lytell new house" thereon was considerable; and there is one entry that shows the great antiquity of the modern custom of "standing treat: " "Itm. for ale to dyus men that holpe to slinge the grete stonyts at the Cawsey, viij*. That was something considerable; for 6d. a day was then about the average wage of artificers; the masons' labourers engaged on the "lytell house" had, however, this higher amount, "because it was harvest tyme." And so I find in this year a Spaniard paid for carrying stones to the Cawsey, and 6d. a day given to two "men of Stok" for similar work. John Paynter had 3s. 6d. for a ring of iron; and I am sorry to say that one of John Grysleng's servants was drowned in "slyngynge of stonyts for the Cawsey."

In 1512 machinery was provided for the chain. A carpenter unnamed had 3s. 6d., at 7d. a day, to make the "wyndyne" (windlass) "for the cheyne at the Cawse." The timber cost 2d. For a "rope to wynde up the chayne, weyng lxvi. lb.," 8s. 6d. was paid; and a staple to "waye up the chayne," weighing 9 lb., cost at 1½d. the pound, thirteen pence. All this, however, was insufficient. The chayne broke, and "Shuge" had 16d. for mending it, after 4d. had been spent in the same way apparently to little purpose. Then more iron was put on the mast of the Cawse, and nails and spikes bought for the end of the "sayleyard," while "balche" was provided for the rope of the chain. And next we find "It. for a greate yard to lye w't the Chayne at the Cawse xx*: It. for lvj. li. of yrerework for the end of the yard vj* iiij*." Thus the
mouth of the Pool was defended by a boom as well as by a chain; and in the next year we find entries of the charges incurred for hanging up the mast at the Cawse, while in 1524-25 2s. 8d. was paid "for wyndynege of the Chayne at dyuse tymes."

The corporators, wise in their generation, had no notion of spending all this money on the Cawsey without return. At any rate they did not see why any should benefit by it who did not pay towards it; and so in 1508-9 we find "It. recd of dyvers straungs this yere lij. hake gyven to the Cawse." These were dried and sold for "v" x* viij*". This is the first of many similar entries; and when it is said that the hake were "gyven," I take it that no compulsion was exercised, only that the "straungs" were made very clearly to understand that they must. What the hake were demanded for is shown by an entry in 1536-37: "Itm. Rec. for the Castell hake reed. of straunge bots that mored themselffe w* the Cawssey this yere viij* ix* ob." From that date the term "Castle hake" replaces "Cawsey hake." Whether the Castle needed more repairs than the Cawsey, or whether, seeing that the Corporation had a tonnage right within the Pool, the demand of an additional commercial impost was deemed illegal, I cannot say. The change, however, was made. If the Cawsey no longer served the turn of the Corporation the Castle did; and the impost has descended to our time.

Hake were held in deserved estimation in these days. In 1533-34, when the town got rid of its payment to the Prior of Plympton, a present of three quarters of hake, worth 20s., was sent all the way to London to "Mr. Crumwell." This was evidently appreciated; for in the following year 13s. 4d. was spent on certain dry hake sent to Mr. Secretary, the carriage of which to London cost 12s. 8d. And as to "gresyd congers," whatever the operation of greasing may have been, they were deemed a dish fit for a bishop.

From the fact that the Cawsey was supplemented during the sixteenth century by various wharves and quays in Sutton Pool, we may fairly assume that the commerce of the port was then recovering from the depression of which so much complaint had been made. Thus a "Crane Key" is mentioned in 1519-20 with "William Pull's kaye," and "Allyn is key." In 1572-3 the "key on South side" was built "from the Barbican, under full sea mark: in length 130 feet, and in breadth 44." Then we find William
Weekes, presumably the mayor of 1558–9, binding himself to maintain and repair during his life the "causse at Coxside, that I dydd there make." Smart's Quay was built in 1601.

Sutton Pool from an early date was commonly in the hands of the town authorities. In 1481 £1 4s. was contributed towards the reparation of the church of St. Andrew, and the making of its south aisle, out of the pence of the farm of Sutton Pool. Courts of the water of Sutton Pool were, however, held on behalf of the Duke of Cornwall. Roger Edward, "sub-bailliv," was directed in 1479—19th Edward IV.—to take twelve legal men of Plymouth, six of Stonehouse, six of Yealm and Newton Ferrers, and six of "Horson," and in legal court before Nicholas Henscott locum tenens, who was then mayor, to make sundry inquiries into matters connected with the Pool. As I have already pointed out, such rights in the Pool as the Prior of Plympton had possessed the Corporation enjoyed. The Duchy rights they appear to have rented or farmed. They had a water-bailiff appointed yearly, and made regulations for the general conduct of the traffic. Here is an abstract of an order, the earliest I can find on the subject, made in 1568 by William Hawkins, mayor, John Fitz, recorder, the twelve and twenty-four, concerning "the good kepyng of the poole and water-side under the ffull sea marke."

No manner of ballast, nor the "swepyng or clensyng" of any ship, was to be cast into the Pool; no anchor to be put out "without a boye vpon hym, or a pole to stand by the anker, that people may knowe where the anker lieth;" no stones, timber, or other things to be cast into the Pool to any common prejudice; no graving-pits to be left unfilled after use; no "landing kayes accustomed to be mayntayned" to be suffered to fall into decay; nobody to "bryng any kynde of stingkyng thyng to the water's side, as flyshe, filesh, deadd beasts, as dogges, cattes, swyne;" all ships discharging within the Cawse were there to take their ballast, and that without allowing any to fall into the water; no one taking "any stone or other thyng whereon to stape into any bote or sheepyng" should leave it in the water; no timber should be buried in the "ose," save in the lawful place; and that no "guttyng or heddyng of flyshe be caste vpon the kayes, or left vpon the kayes." All breaches of these regulations to be visited by fine.

One regrets to find that such well-intentioned regulations were
not duly observed and kept; for in 1600 the Grand Jury com-
plained that by continual bringing of stones, sand, and other 
things to the quays the Pool was injured. So it was ordered that 
every lighter should each year carry away a lighter of "ose, 
robbell, or filth," until the Pool should be sufficiently cleared.

But the Corporation had a much fuller notion of their powers 
than such regulations imply. You have already heard how they 
set themselves to prescribe the conduct of trade. They also turned 
their attention to the due regulation of commerce. In all things 
their idea of the common weal was to be supreme, and individual 
rights counted for little or nothing. It is not easy to see what 
scope they left for private enterprise; but I suppose there were 
ways and means of evasion.

In 1564 it was ordered that no resident should buy any meal 
brought to the town, on pain of forfeiture and other punishment. 
This was to compel the inhabitants to have their corn ground at 
the town mills, which formed one of the chief sources of the town 
income, and at this time yielded £24 a year rent. These were the 
rolls at Millbay. One wonders whence the windmill on the Hoe 
got its business. In 1570 it was directed further that no one was 
to grind any corn away from the mills, on pain of forfeiting three 
times the just toll per bushel; and the millers who did wrong were 
likewise to restore threepence. And three years afterwards we light 
upon a record of the most distinguished miller Plymouth ever had 
before the time of Sir Francis Drake—no less a person than Sir 
John Hawkins, who, with his brother William, rented the town 
mills; bought a house at "Pope's Head" to weigh the corn in 
before it was carried to the mills; and kept a man with a horse 
ready, on due warning, to fetch the corn from the houses of the 
inhabitants, which no doubt the said inhabitants found mighty 
convenient.

It is curious too that in 1580 we find mention of a prototype of 
the Royal Hotel—the Town Tavern—in respect of which Walter 
Battishill, Humphrey Fownes, and Christopher Seeley agreed to 
pay yearly £3 6s. 8d. at the winewits audit.

As to general merchandise, in 1575 it was enacted that all goods 
brought by sea should be put, before purchase, into the common 
hall, "the large Seller adjoining the Crane Kaye," under penalty 
of £5. Three years later, John Sparke (mayor in 1583–4) pro-
vided a sufficient cellar for receiving strangers' goods, being
answerable therefore. He was not to charge rent, but to be recompensed by a moiety of the moneys the town ought to receive thereon.

And in 1575 there was another very sweeping enactment, that no one should buy wine, commodities, or merchandise coming to the town by water, without having made the mayor privy thereto, in order that, if they so desired, the mayor and his brethren might buy for the town. If they did make a purchase, then every free-man had to take the share of goods apportioned to him. I fancy that this could hardly have been operative, or at least that it must have fallen into desuetude; for in 1597 it was further enacted that no merchant or other inhabitant should "bargain for deal boards, corn, grain, salt, or other victuall, wyne only excepted," up to £5 value in all cases except deal boards, and then to the value of £10, until the mayor had been apprised, and decided whether he would deal for the profit of the town generally.

It is quite certain, however, that these regulations were of some weight. In 1603 fines, &c., were inflicted on the parties offending, because Pascowe Pepperell had forestalled the market by buying coal at 7s. 10d. the quarter and selling it at 8s. 8d., which does not seem to me a very extravagant profit. In 1605, too, there were sundry fines and imprisonments inflicted for buying rye within the Cawsey contrary to rule.

The regulations made during the sixteenth century with regard to fish were very numerous and important. In the mayoralty of Nicholas Bickford, 1565-6, it was ordered that no alien should lade or buy fresh pilchards above the number of 1,000 in a day, no man not being free to buy or sell above 5,000, unless the fish were "in danger of perishing." Alien is explained by the words "als brytton, flemynge, Speynerde or other." Then in Drake's mayoralty, 1581-2, other orders were made. No one was to promise or sell any pilchards before they had them (no time-bargains then). Any person suspected of selling or promising to deliver pilchards before they were "saved" (that is, cured), or of having received money beforehand from any non-inhabitant to "make" (cure) the same, was to be questioned on oath before the mayor, and if guilty, not allowed to "make" any more pilchards that year. No woman, whether wife, widow, or servant, was to set or make a price for or upon any pilchards brought to the town, under penalty of 10s. fine (to be paid by the husband or master, if no
widow) and personal punishment, as usual at the mayor's discretion. In 1584 a more stringent order was passed to the same effect, including hake, but allowing women to make provision for their households. Those who brought hake to the town were to sell to every freeman equally some indifferent portion. Freemen who aided any stranger to break these regulations were subject to severe penalties—losing their liberty, and having to pay heavy fines, from 5s. upwards. In Walter Pepperill's mayoralty, 1590–1, a tax of 8d. per last was laid upon pilchards saved except for household use, towards the defence of the town.

One of the most amusing entries anent fish concerns the fishwomen. In the mayoralty of Humphry Fownes, 1596–7, these traders were considered by the "twelve and twenty-four" to have unduly multiplied. So their numbers were restricted. The names of the favourite ladies of the Corporation who were allowed to continue their business were—Cyslie Barons, Johanne Straunge, Katheren Earle, Cyslie Sherwill, Thomasine Prince, Rahatch Dune, Elizabeth Lanne, Alse Bree, Agnes Clifferde, Alse Gilbert, Elizabeth Harte, Nell Seelye, Alse Lawrell, Elizabeth Evens. No mention is made of a penalty for unlicensed hawking, but we may be sure there was one. Three-quarters of a century later, 1656–7, it was enacted that women who went about "trucking" to ships without leave should be set in the ducking-stool at the Barbican and haled up and down three times; and I suspect this would have been the style of punishment in 1596.

Before passing to the seventeenth century it will be of interest to quote sundry items from the Receivers' accounts. In the concluding years of the fifteenth century the average corporate income appears to have been somewhat under £60; and the expenses were within that amount. In 1509–10, however, the receipts went up to £89 7s. 4d.; and the expenditure then advanced so rapidly, that the Corporation got into debt. In 1511–12 they actually spent £123 11s., though their ordinary income did not average £70. The extra outlay was chiefly caused by the need of improving the works of defence. This seems to have had the result of making the "twelve and twenty-four" look about them for new sources of income; and so we find them snapping up all sorts of "unconsidered trifles." Thus in that year Edward Peryn, of Totnes, was arrested upon suspicion because he had certain gold upon him, and was sent to Exeter. Master Recorder had £3 16s. 6d. voted to
him "because he labored that the towne had the golde which was taken w'the same man;" and "xxi dokatts" of the money were given to John Gryslynge for the "repacon of the Cawse"—£4 14s. 6d. No doubt the town stood much in need; but what of poor Edward Peryn? Nothing is clear about this business except that he had the money when the town wanted it, and wanted it when the town had it. He was a friend in need. I will not define the Corporation.

Two years later there was a notable piece of good fortune. It was time of war, and there came into Plymouth a certain Flemish ship with "vj ffrenshe psons" on board, who were unlucky enough to be the owners of eight butts and one hogshead of Romney wine. A Fleming told the mayor; had 1s. 6d. for his trouble; and the Frenchmen were incontinently made prisoners, and their wine sold for the benefit of the town, realising in the gross £17 3s. 4d., besides one hogshead which was given to John Palmer for work done on the Cawsey. The men themselves were held to ransom. The entry relating to this transaction is very amusing:

"Item Rec'd of oon of the forsaid vj ffrenshemen that were taken psons yn the said flemyng shyp the which was a pilott yn the same shyp for his Rawnsom (xl*) and of two other of them (xx*) a pece beside oon of them that dyed and beside ij of them the whiche went home for their Rawnsom and came not ageyn iijii."

This not unnatural evasion taught the authorities a lesson. They caught six other Frenchmen that year—one each in a Spanish and a Flemish ship, and four taken prisoners "by the towne"—and made them pay their 20s. each before they started.

It is satisfactory to note that the master of the Fleming which brought the wine was paid his freightage, £3 10s. This singular honesty on the part of the Corporation merits special record. I wonder they did not confiscate the ship for carrying an enemy's goods.

In 1526-7 I find these curious entries: "Itm Rec of tharrogosye for defendyng theyre shyp agaynst the ffrenshemen that wold have taken her xvij. xiiij. iiiij. Itm Rec of Spaynards for lyke defens xxvj. viij."

However, even with this addition the total receipts were only £81 5s. 6d.; and there was some expenditure incurred in manning the bulwarks for this business, those who manned them being Stephen Pers, William Bull, Christopher Moore, William Hawkyns (this would be the father of Sir John),
John Pers, Richard Horswell, Simon Weryng, Richard Gerrard, Nicholas Sark, Langharne, and Laurence, who had a number of men to wait upon them. I conclude, however, that the transaction was profitable, from the significant entry, "Itm Spent in wyne when the Spaynards p* theyre money xxij". The French captains were "commaundyd to come a lond" to be spoken with, that the peace might be kept within the port. Two shillings were spent on them in wine then; and they cost £1 6s. 8d. in maintenance when they were kept three days "a-lond" against their wills.

In 1528-9 we have several miscellaneous receipts—5s. of a Spaniard "for a fray;" 1s. of "lewys meadowes and the ij pegons for Carde playinge;" 20d. for a window forfeited to the town for a deodand; 3s. 4d. of John Norton for a bloodshed; and 20d. a-piece from Henry Martyn, John Moore, Robert Hmptoy, and Alst Saunders, brewers, for "brekeyng of the assize of ale." These were of course court fines. In the next year a "strayer nag" sold for 3s. 4d. In 1538-9 6s. were received for a "ffustyan blankett" and a "harte of sylu" and gilte which was taken from lytell Rawe the taylo for an Excheyte to the Towne." And even the fishing within the Cawsey was made a source of revenue.

It has always been a question what became of the church plate taken from the churches in the town at the time of the Reforma-
tion. An entry in the Receivers' book, however, solves the problem, and supplies us with an inventory of these goods. They were sold to buy "gunpowder, bowys and arrowys," and other munitions of war.

Some of the items of expenditure are very amusing, and indeed the accounts generally would afford ample material for comment. Here, however, I can deal only with matters affecting the commerce of the town. Furze had to be found for the "ffyre bekyn" at the Hoe, and candles for the bulwarks, as we find by the first account preserved, that of 1486. In the same year, too, are entries relating to the ordnance, and to the provision of ammunition. "Jheffry thomas barber ys man" was paid for making balls of "led and eyrryn" for "thykpeny ys bol werke." In latter years we find stone shot used, some made of "More" and others of Staddon stone. It appears to have been the custom to drag the guns to and from the Hoe as need was; though the great guns may have been an exception. In this year also occurs the first of a long series of entries of payments to the watchman at Rame. For "kepying off
the bekyn ther and bringing iiiij tymys" he had the munificent sum of 4d. However he was paid better as time went on. In 1511-12 eighteenpence was delivered to the parson of Rame for him; and in the next year he not only had 2s. for his "yeares wages," but 4d. for a reward "to come and yeve warnying of shippes at sea." In 1522-3 he had actually 4s. for his yearly wage, and 1s. for his labour in coming to Plymouth sundry times. Lucky man; but he must have thought himself luckier still when in 1543-4 he received 8d. for "comyng hether by nyght when the new founde lande men came yn." The "waccheman of Rame," however, had to be supplemented in 1537-8 by two others, who watched "the water syde for pyratts." The Spaniards said there were no other kind of folk to be found at Plymouth!

What is rather amusing, considering the use the guns were to be put to, is that ordnance were bought in Spain. In 1504-5 two great guns were "bought out of Spaine," and paid for by 22 dozen of "whytts," worth £7 11s. 8d. This cloth was packed in canvas and sent to Saltash to be forwarded. There had been an agreement drawn up with the gunmakers, and three "chesys" worth 10d. were included in the bargain. The ordnance of the town were then rather scanty. There was a "brazen gon," and the end of the great gon (which a "portyngal" not long before had been mulcted in some wine for damaging) was caulked with oakum! while a piece of iron was nailed over the mouth to "kepe hym close." In 1509-10 two other guns were bought out of Spain, and they were paid for partly in hake. Subsequently, I fancy, some of the leading inhabitants must have armed the town. The mention of William Randell's and John Ilcomebe's, Mr. Pollard's and Stephen Pers's guns seem to imply as much. In 1528-9 William Hawkyns sold two brass guns to the town, and was paid in instalments of £8. A few years later other guns were bought in Flanders. And then there was continual expense on the bulwarks, and on the "gun slyngs" and "chambers" and the like, so that it is no wonder the town got into difficulties. The Crown does not seem to have rendered any help until 1544-5, when the King gave two brass cannon. At length, however, the preparations for defence became so extensive and costly that money was collected in the district to aid the Plymouth folk in their heavy undertaking. Their charges were increased in 1547-8 by the fortifying of Drake's Island, about which Sir Francis Fleming came down, and subsequently
Sir Gawen Carew. Finally the townsfolk learnt how to make guns for themselves. And I may note here that divers were not unknown. In 1548–9 a gun-chamber was dropped overboard, and was picked up again by divers, who had 6s. 8d. for the work. It is a small matter, but I may as well record also that in the following year 7s. was paid for painting the town drum and 20d. for covering it.

The Corporation were at some cost concerning the preservation of the haven from the damage caused by the tin-streamers. A commission relating to the tinners is mentioned as early as 1486. In 1538–9 divers “platts of the Town and port were made,” tyn-works viewed on behalf of the town, and a presentment entered concerning the haven, while by the order of the Lord High Admiral a “view” was taken of Cattewater. Two years later 3s. 8d. were paid for “viewing the stremme Brok that descends down hurtfull to the haven.” In 1542–3 there was riding to the petty sessions at Ermington against the tinners; and in 1543–4 there was a nisi prius suit against them. In 1544–5 John Sprye had £1 13s. 4d. for “payntyng a platt” of the haven. Two years later he made another “platt,” which was taken to Sir Peter Carew; and the tyn-work was viewed again. You know that Acts of Parliament were framed to restrain the streamers from damaging the haven; and that one of the chief objects of Drake in the construction of the leat was to repair this damage by flushing the harbour, i.e. Sutton Pool.

The commerce of Plymouth was at a low ebb in the concluding years of the sixteenth century.* Drake and Hawkins, and most of their companions, had passed away, and with them for a time the spirit of the earlier Elizabethan days. The townsfolk lived in continual dread of Spanish attack—a dread quite justified by the fact that in March, 1596, a party of Spaniards landed from a pinnace at Cawsand and set sundry houses and boats on fire; while in April, 1599, some Spanish vessels actually captured and carried off fishing boats from within the Sound. Every now and then the alarm was made by “the watchman at Rame” that the Spaniards had come, and almost every fleet that passed was thought to be

* In the year Michaelmas to Michaelmas, 1571–2, there were sixty-nine ships belonging to Plymouth—One of 100 tons; two of 80; three of 60; four of 50; eleven of 40; two of 35; seven of 30; five of 25; twelve of 20; three of 16; four of 15; three of 12; eleven of 10; and one of 6 tons. Bristol and Southampton had fifty-three each.
the dreaded foe. There were rumours too of treachery. In 1597 it was currently reported that Plymouth had been sold to the Spaniards for 50,000 crowns, and among the English prisoners of war who had entered the Spanish service was one Thomas Griffin of this town. There were other and more real dangers. We in these later days can hardly fancy that Turkish pirates ever infested these waters; yet in 1617, when the inhabitants opposed the granting of the monopoly of the Portugal trade to a body of merchants, they set forth, "the loss by pirates every day increaseth." And there were other buccaneers at work. In 1629 seven sail of "Dunkirkers" haunted the coast for a month, and took twenty vessels, of which four or five belonged to Plymouth. Most of their company were English or Scots. The French Protestants of Rochelle, who made Plymouth a rendezvous, were not much better; and it is very evident that there was a good deal in progress which was little removed from downright piracy between the Dutch, French, English, Dunkirkers, and Rochellers.

Nor were the Plymouth folk themselves at all behind hand. They seem to have done in the reign of Charles I. very much the same that their successors did in the reign of George III., and to have abandoned the peaceful pursuits of commerce to go a privateering. This kind of enterprise was so much in fashion here in the opening part of this century that, when the great struggle with Napoleon came to an end, the legitimate commerce of the port had been practically annihilated. And so during the wars with France and Spain, between the years 1625 and 1629, letters of marque were granted to sixty-five Plymouth ships, varying from 330 tons to 21, owned, and in some instances commanded, by leading merchants of the town. Plympton also sent forth one; Oreston, four; Saltash, five; and Millbrook, three. You cannot very well trade and privateer at the same time; and while Abraham Colmer, Nicholas Sherwill, Robert Trelawny, James Waddon, Abraham Jennings, Nicholas Opie, Bartholomew Nicholls, Francis Amadas, Henry Gayer, Roger Polkinhorne, and their followers—Puritans and Privateers—were despatching their letters of marque, they could have had little leisure to look after ordinary mercantile affairs.

The royal expeditions fitted out here had a similar tendency, monopolizing for the time the whole resources of the port. Thus in 1625 the mayor had to billet the 10,000 soldiers whom
Charles I. personally sent on an expedition to Spain, which terminated in "disgrace and disappointment," and when it returned brought back the plague. In the April of 1626 fourteen or fifteen were dying daily in Plymouth, and the inhabitants were flying to the country. In June all commerce had ceased; the town was destitute of its best inhabitants; and the infection had spread into all the parishes where the soldiers were quartered. In July there were only two of the magistrates or aldermen left in Plymouth, and no constables. Altogether 1,600 of the townsfolk died. Two years later the Duke of Buckingham’s miserable expedition for the relief of Rochelle sailed and failed. He had better have given relief at home. The sailors of the Lion, Adventure, and Vanguard, then lying in the harbour, were so ill provided that, for want of victuals, they robbed all who came near them. This was the way in which Charles I. went to war abroad, with half-starved and mutinous sailors. No wonder that he fared no better afterwards at home.

We may infer the “badness of the times,” too, from a petition of this date to the Privy Council, to prohibit the exportation of pilchards, save in ships of Devon and Cornwall, it being set forth as a reason “divers ships and mariners lye idle without employment within our harbour” while foreign ships were continually employed, and special mention was made of certain Flemish vessels of great burden being so engaged.

The materials for a survey of the commerce of Plymouth during the first half of the seventeenth century are very scanty. The Receivers’ records for this period have disappeared; and if by accident a few rough account-books had not been preserved, we should be left wholly to inference.* The tonnage dues received by the mayor, at 1d. per ton, for the foreign and alien ships which came within the Cawsey, from 1514 to 1582, ranged from nothing up to

* The Town Customs in 1623 yielded £20 12s. 5d. Malt, barley, wheat, peas, rye, and salt, paid 4d. a qr.; hops, canvas, 2d. a hundred; cloth, 4d. a piece; wine, 6d. a tun; beef, 6d. a tun; sugar, 4d. a chest; dry-fish, 3d. a thousand; salt, 1d. a ton; coals, 1d. a wey or chaldron; herrings, 6d. a last, 3d. a barrel; “kerses,” 3d. a piece; hides, 1s. a hundred; tar, 6d. a last; vinegar, 2d. a tun; iron, 4d. a ton; oakum, 1d. per cwt.; healing-stones (slates), 3d. per thousand; tallow, 2d. per hundred; “trayne” (oil), 4d. a tun, 1d. a hogshead; “caske,” 1d. a ton.

Quantities levied on: 70 tons 3,933 qrs. salt; 234 chal. 131 weys coals; 27 last 160 barrels herrings; 352 qrs. malt; 167 qrs. barley; 60 qrs. wheat.
£4 5s. 5d. a year, and this never seems to have formed an important item of the town revenues. A calculation made by one William Borrowes of the probable proceeds of a tax of 3d. a ton on all shipping passing from the town for every voyage (which he proposed should be levied for the purposes of the Castle), as not exceeding £40 or £50 a year, makes the total taxable tonnage at the commencement of the seventeenth century between 3,000 and 4,000 tons only. The import of coals he puts however at 10,000 chalders.

A memorandum book for the year commencing Michaelmas, 1623, shows that £6 6s. 6d. was then received for cranage, the articles craned including beer, wine, water, pilchards, train oil, timber, cider, ordnance, currants, vinegar, and tombstones. In the following year the moorage produced £8 12s. 11d.; and 195 ships paid charges varying from 4d. to 2s. Next to the English vessels the Scotch were the most numerous, then the French and Flemish. There were several Jersey ships, and a couple of Danes. In the next year bushelage and keelage yielded £16 7s. 5d. Bushelage consisted of a bushel taken from each cargo of dry goods, chiefly coal, salt, malt, barley, and wheat; though half a bushel of "peasen" appears to have sufficed. The charge for keelage was uniformly 1s. 4d. In 1633 the receipts were—Moorage, £9 12s. 10d.; quayage and customs, £44 16s. 8d.; tonnage, £4 13s. 3d.; cranage, £2 8s. 10d.; total, £61 1ls. 7d. This, you will understand, was the revenue the town received from Sutton Pool.

The town customs, as I have already explained, were originally granted to enable the inhabitants to defend the town; and I have also alluded to the fact that Elizabeth added to this a tax on pilchards. When the "fort on Haw clifts" which was the immediate predecessor of the present Citadel was built, the command was conferred on a nominee of the Crown, upon whom the charge thence fell. However the Corporation held to their customs. The value of these varied greatly. They were farmed by "Thomas Edmonds, gent" (father of the eminent statesman of the same

and peas; 25 qrs. peas; 176 qrs. rye; 27 hundred hops; 60 hundred tallow;
388 thousand healing-stones; 154 thousand dry-fish; 1½ tuns wine; 7 tons beef; 15 hundred canvas; 5 chests sugar; 17 pieces cloth; 6 tons "caske;"
15 hundred hides; 9 last tar; 12 tuns vinegar; 12 tons iron; 3 tuns 10 hogs- heads "trayne;" 50 "kerses;" 28 hundred oakum.

The cloth and nearly all the salt came from France; the "wey" coal from Wales; the "chaldron" Newcastle.
name), in 1568–9 for £5 a year. The increase from that time for the next half century or so must have been very slow; for in 1623 they only yielded £20 12s. 5d.; nor do I think there could have been much improvement for several years. When, in 1634, Devonshire was ordered under the ship-money writs of that year to furnish a ship of 400 tons, Plymouth was only assessed at £185 0s. 8d., while Plympton St. Mary had to pay £184 16s., and Barnstaple £252 4s. 8d. But in the following year, when £9000 was demanded of Devon for a ship of 900 tons, Plymouth had to pay £190 against Exeter's £350, while Barnstaple went back to £150, and Plympton to £35. Dartmouth was assessed at £80, and Totnes £120. If it is safe to draw any conclusion from the comparison of the two years, we might perhaps assume that the commerce of Plymouth was of a very fluctuating character, and that some improvement had taken place in the interim. And that there were very remarkable fluctuations there is plenty of proof. The most serious falling off was that caused by the great siege, which put an end to all commercial operations, and reduced the town to such a state of extremity that it was for the time relieved of all duties.

Under the Protectorate Plymouth must have thriven. The first Receivers' accounts of the seventeenth century that have been preserved are for 1658–9; and there we find landleave and town custom yielding £129 15s. 6d., cranage and moorage £20 1s. 5d., measurage £1 6s. 8d. Town rents and water-cocks produced £74 9s.; but the chief item of receipt was still, as of old, the town mills—not now, however, the old mills at Millbay, which figure so prominently in the early history of the town, but the mills built on the leat—which brought an average revenue to the corporation exceeding £200, while a fourth of the net receipts went to the Hospital of Orphans' Aid. The Corporation derived little benefit from the markets and shambles, except indirectly, then and for many a long year. Master Mayor disposed of these rents in keeping his worshipful table; and as he felt it to be a point of duty to entertain all the distinguished strangers who visited the town, he was continually pleading that his income was not sufficient, asking for more, and getting it. I will say this for the old unreformed corporation, down certainly to the middle of the last century, that they were always given to hospitality—at other people's expense. But the way in which they squandered the town
funds is almost inconceivable. All through the seventeenth century, and well on into the eighteenth, they were in difficulties; but they had very little idea of self-denial in the way of the reduction of banquets. They did stop paying their members; and not only so but they managed eventually to get their members to pay them—a custom I am afraid not altogether confined to Plymouth, and not limited to the seventeenth century.

When their difficulties were very pressing, they borrowed money in the first place, helped themselves to the charity property in the second (the chest of the Hospital of Orphans’ Aid was a capital bank), and wasted the town property in the third. They used to grant leases on lives or for fixed terms for fines at nominal rentals, and when all the property was leased would lease it again on reversion, two and three leases deep, securing the best bargains for themselves. Thus the estates of the town were rendered almost wholly unproductive, for they spent the fines as soon as they had them. By and by they went a step further and got rid of the fee. Very few Plymothians have any idea of the once enormous extent of the town lands. If they had been properly dealt with there would be no need of any rates in Plymouth; but they were wasted and spoiled. The lands of the corporation included the Marshes, on which Union Street and its adjuncts now stand; the “Great-hill” above Pennycomequick, Tamelary, Windmill Park, &c., on the east; the Vawtiers, Crosse Down, Well Park, Mayes’ Cross, on the north; Frankfort Fields, adjoining the Marshes, on the west; and property in Green, Bilbury, Kinterbury, St. Andrew, Stillman, Tin, Looe, Lyme, Lynenham, Buckwell, Petherick, Market, Castle, Vennell, Whimple, Treville, Finewell, High, Batter, Market, Notte, East, and Woolster Streets; Katherine, Hoe, Loaders, Whitefriars, and Peacock Lanes; also at Briton Side, Coxside, Southside, Friary Green, Old Town, the Hoe and the Quay, with Corpus Christi House and other properties adjoining.

This however is a digression. The average ordinary receipts of the Corporation during the latter half of the seventeenth century were about £500, though over £1000 was at times realized by the system of lease fines. The town custom had a singular course. In 1659–60 it fell to £77 8s. 4d. In 1665–6 it was £239 2s. 4d., the highest figure reached. Then it oscillated a while between £60 or £70 and £150; and in 1680 commenced a steady decline, which brought it by 1690 to little more than £6. In 1696–7 it
rose to £70; and then fell off again, until by the commencement of the eighteenth century it was nil. Subsequently it again appears, but not to any important extent. I do not think these oscillations, though partially dependent on the fluctuations of trade, were wholly so. The right of the Corporation to collect custom was resisted at various times; and when Sutton Pool passed out of their hands, though no immediate effect of importance in this item can be traced, yet some difference must have been caused. Moreover, the quayage of the town quays became more productive as time went on, and yielded £60 in 1720, against £12 16s. 9d. in 1669-70, and £25 15s. in 1699-1700.

Early in the seventeenth century we come across the first evidence of interference with our trade of the absurd privileges claimed by the Corporation of Saltash. A great ship had sunk in Cattewater, to the sore damage of the harbour of Plymouth, which required in 1637 £2255 to put it in proper order. The Saltash people would do nothing to remove the ship. Quite enough for them to collect their dues. So the merchants of Plymouth appealed to the authorities. These declared it to be only reasonable that the mayor and commonalty of Plymouth should receive 1d. a ton on all ships coming within the port, which then included all the harbours on the south coast of Cornwall (thus creating a new grievance after the fashion of the Saltash one), 1d. per ton on all ships belonging to the port for every voyage; and 6d. per ton on all pilchards laden in the Sound for export. This was to be in force for three years if needed; and Saltash was to remove the ship, and pay a half of its dues to the reparation of Plymouth harbour. Hereon Saltash came to terms, gave up to Plymouth the ballast rights within Cattewater and Sutton Pool, paid £20 a year for three years, and agreed that the care of Cattewater in future should be joint. It was at the same time ordered that every Plymouth lighter and sand-barge should each year take away a load of rubble, &c., from Cattewater, and deposit it on the southern part of "the fretted neck of land called How Stert;" i.e. the Batten isthmus.

In 1617 Sutton Pool was leased by the then Duke of Cornwall, Prince Charles, afterwards Charles I., to John Sparke (he of the Friary) and John Howell, of Plymouth, in farm, for twenty-one years, at a yearly rent of £13 6s. 8d., the lessees taking all the profits of the anchorage and keyladge of all ships coming within
the Pool, and the measurage and lastage on all which discharged there, fines of fishing boats and pottage of fish, and the Duke reserving all prisage and bushelage, wrecks of sea, customs of cloth and leather, petty customs, goods of pirates, and maritime jurisdiction.

On an enquiry made during the Commonwealth (Oct. 7th, 1650) concerning the water and pool of Sutton, it was declared that the rights of the same, anchorage, keelage, measurage, bushelage, lastage, toll of fishing boats and pottage, had been granted for 20½ years from March 25th, 1638, for £13 6s. 8d. annually, to Sir John Walter, Sir James Fullerton, and Sir Thomas Trevena; that they in the same year had assigned their patent to Thomas Caldwell, from whom it passed in succession to Sir David Cunningham, Peter Headon, of Plympton St. Mary, and the Hospital of Orphans' Aid. Houses had been built on the bank of the Pool within high watermark; but the foreshore was all claimed by the Corporation as part of their manor of Sutton. The Pool was really then in the hands of the municipal authorities. At the Restoration it was leased by the Crown for thirty-one years to Lord Arundel at £45 a year rent; and proceedings forthwith commenced between him and the Corporation. The latter were cast, and not only lost the Pool, which was worth £100 a year, but £2500 costs.

Nor did litigation end here. In the first year of the reign of Elizabeth an Act of Parliament had fixed "Hawkins's Quay," which was either built by or adjoining the property of one of the Hawkinses (Sir John I presume, as it afterwards came to Sir Richard), as the sole legal quay for landing goods. This quay in 1664 was unprovided with a crane (probably the old one had been worn out); and so the customs authorities in London, pointing out that it was the only lawful quay, and that goods landed elsewhere were liable to seizure and confiscation, the benefit of which they heard "doth redound to the town," required a new crane to be supplied; which was done, at the cost of £19 1s. 2d. This, however, was a small matter to what followed. William Jennens, who had the general conduct of the Arundel suit on behalf of the town, and John Warren, another merchant, claimed Hawkins's Quay as theirs—partly as Jennens's Quay, and partly as Warren's Quay—and demanded fees for landing goods. This led to more law. Our Quarter Sessions declared that these quays were not the property of Jennens and Warren, but belonged to the Corporation;
and thence the case went to the superior courts. It was a very pretty quarrel. Lanyon and certain other merchants declared that the quays claimed by Jennens and Warren were really Hawkins's Quay, at which, time out of mind, goods had been freely laden and unladen, without charge to the freemen of the town, and to the inhabitants of the neighbouring towns and villages; that Jennens and Warren having got hold of Sir Richard Hawkins's deeds, in the course of the law-suit with Arundel, were keeping them back, whereas they would show the true rights of the property; and that Jennens, being "a powerful man," had forced some people to pay dues, and had "persuaded" others. The mayor and Corporation, on their part, contended that the quays were theirs, included under the term "New Quay," and built on part of the waste of their manor of Sutton Prior. It had been a very "old and ruinated quay," and they had repaired and "beautified" it, making it much more commodious. Moreover, by their quay-masters they had regularly collected the petty customs there (these customs included, by the way, a faggot or billet of wood for the old almshouses from every boat so laden); and the fact that different parts of the quays were called by the names of different people did not make them their property. The quays were only so called, for "distinction and difference sake," after people whose places of business adjoined.

Jennens and Warren, thus assailed from two different quarters, charged their opponents with being in league, and insisted on the rights of private property against the custom of Lanyon and the manorial and corporate privileges of the town. They challenged the Corporation to show that the New Quay was built before 1576 or 1577, and denied that Hawkins's Quay or Custom House Quay (which was another name for that held by Warren) were any part of the New Quay at all—referring, moreover, to the town writings or records being burnt about seventy years previously. What was the end of this business I cannot exactly say; but whatever Jennens and Warren may have retained, there still remained town quays, which in 1693 underwent considerable repairs; while in 1730-1, when they wanted reparation again, 161 dozen of timber wedges were driven, at the town cost, between the stones. A few years later there were negotiations between the town and Lord Arundel for the lease of Sutton Pool; and in 1684 he offered to assign the remainder of his term of seventeen years, and to obtain
a new lease for twenty-one years beyond that, for £5,000, which however he was informed was a great deal too much.

The compass which Sir Francis Drake set up on the Hoe in 1582 was removed, and re-erected at a cost of £2 10s., in 1675–6. Elsewhere I find mention of its having a vane, and it was, I take it, simply a landmark.

All things considered, it is thus questionable whether as a port Plymouth made much progress during the seventeenth century. There was some trade to the East Indies even in the later days of Elizabeth, and in 1621 Sir Ferdinando Gorges was building a ship of a new fashion, which he hoped would outsail the Dutch. Gorges was one of the chief promoters of the once famous Plymouth Company, which designed to do great things in the colonization of New England, but somehow utterly failed of success. It was in 1606 that James I. granted charters to two companies for the colonization of Virginia, Raleigh’s name for the colony he attempted to found in North America, and then applied to the greater part of the Atlantic coast of that country. To the Plymouth Company, which consisted of knights, gentlemen, and merchants of the West of England, exclusive privileges were granted over the seaboard and back country extending from the 41st to the 45th degree of N. latitude. The charter was simply for commercial purposes; and among the chief promoters of this new development of western trade were Sir John Popham (Lord Chief Justice), Sir Ferdinando Gorges aforesaid (sometime Governor of the Fort and Island of Plymouth, and of the old family of the Gorges of St. Budeaux), Edward Maria Wingfield, Robert Hunt, Bartholomew Gosnold, and the famous Captain John Smith, whose rescue by Pocahontas is the most romantic episode of early English intercourse with the Indian tribes. The first vessel sent out was taken by the Spaniards; the second brought home so favourable an account, that in 1607 a colonizing expedition, 100 strong, under George Popham, was despatched, and established a settlement near the mouth of the Kennebec. But the ensuing winter was a hard one, and what with the climate and what with the Indians, the attempt failed, and such of the colonists as were left returned home in the following year. Practically this is all the Plymouth Company ever did; and in the next year we find the London Company writing to the Corporation of Plymouth—“nothing doubting that this one ill success hath quenched your affection for
so hopefull and goodlye an action”—and asking if any individuals were disposed to join with them in an expedition, which should put into Plymouth about the last day of March. Application was also made to the Earl of Pembroke, as Lord Warden of the Stannaries, for one hundred “mynerall and labouring men.”

Some years afterwards, with Captain Smith to help them, the Plymouth Company made other efforts, but with no better success; although in November, 1620, James granted the great patent, which gave all rights of jurisdiction, traffic, and settlement in all lands which did not form the territory of any other Christian power, between the 40th and 48th parallels of N. latitude, to forty noblemen and merchants incorporated as the Council established at Plymouth, in the county of Devon, for the planting, ruling, and governing of New England in America. Here James granted so much that nothing came of it. The pretensions of the Plymouth Company, to whom that monarch had given so liberally what did not belong to him, were laughed at. The real foundation of the United States was laid neither by the Plymouth Company nor by the London, though the latter did establish Jamestown, but by the handful of feeble folk whom we now know as the Pilgrim Fathers, who were backed by neither king nor company, but by God and their own right hands and sturdy hearts.

The most profitable source of commerce for the Western ports of the seventeenth century was unquestionably the fisheries of Newfoundland, in which Plymouth engaged at least as early as the middle of the reign of Elizabeth.

I wish it were in my power to present the Institution with a full narrative of the condition of the internal trade of the town two centuries since. But although no materials exist for such a retrospect as one would desire to make, we are by no means without hints for a fair outline. Plymouth in the seventeenth century must have been in ordinary times a busy and a bustling town. Its streets were paved and regularly cleansed (the thrifty Corporation were even then in the habit of selling the “town scavenge”), and to the rural mind a stroll through Plymouth town must have seemed no faint realization of the glories of the far-distant metropolis. The shops, I take it, were almost wholly of the old-fashioned type which has survived to the present day with some of the green-grocers—open and windowless, though even green-grocers now are advancing with the times, and aspiring to the dignity of plate-glass.
The quaint doggerel which William Strode put in the mouth of his country bumpkin in 1625, is not without its value as a bit of word-painting:

Thou nere woot riddle, neighbour Jan,
Where ich of late have bin-a;
Why ich have been to Plimoth, man,
The like was yet nere zeene-a.
Zich streets, zich men, zich hugeous seas;
Zich things and guns ther rumbling;
Thyzelf, like me, woodst blesse to zee
Zich bomination grumbling.

The streets be pight of shindle-stone,
Doe glissen like the sky-a;
The zhops stan ope, and all ye yeere long
Ise think a faire there be-a.
And many a gallant here goeth
'I' gnold that zaw the King-a;
The King, zome zweare, himself was there,
A man, or zome zich thing-a.

Observe the touch of nature in the mention of the shingle stones that "pight" the streets; in the wonderful character of the shops that stood open all the year long, so stored with merchandise that our friend thought a fair was onward; and, finally, his conclusion that the King was "a man, or zome zich thing-a." No wonder that "neighbour Jan" declared:

'Chill moape no longer heere, that's flat,
To watch a zheepe or zheene-a,
Though it so var as London bee,
Which ten miles ich imagine
'Ch'll thither hye, for this place I
Do take in great induggin.

But the rustic mind is easily roused to wonder, and the Plymouth of 1625 need not have been so wonderful after all. Forty years later, however, we have testimony to its attractiveness from one who was familiar with the great cities of Italy. He was an Italian who came hither in the suite of Cosmo di Medici, Grand Duke of Tuscany in 1669, and is almost as enthusiastic as the unnamed friend of "neighbour Jan." In his general facts he is sadly at sea, knowing either a good deal less or a good deal more than the Plymouth folk themselves; but he does tell us that the life of the "city" was navigation; that very few people were to be
seen besides women and children, the greater part of the men living on the sea; that the houses were high, gabled, and many-windowed; and that in the town not only were all the necessaries of life to be found—meats, clothes, and stuffs—but many other things suited for luxury or pleasure, not omitting plate, watches, and jewellery! I don't think we could say more of Plymouth now than that.

The cloth manufacture is the earliest traceable connected with the town. There is no record when it was established; but it was certainly carried on here in the reign of Elizabeth. When Drake brought in the water he built four mills in the town; and two of these were used, if not from the time of their erection yet very soon afterwards, as tucking or fulling mills. These were the mills in what is now called Russell Street, but then Horsepool Lane. They were known as the Eastern and Western Fulling Mills, and were leased by the Corporation with the right of setting up racks for the cloth in the lane and on the “Great Hill;” for such two centuries and a half since was the name of the ridge overlooking Pennycomequick. The first fuller mentioned in the town records is John Chare. He had leased the Western Fulling Mill, a moiety of which was leased in 1666–7 to Stephen Forstrete. John Chare was the father of Abraham Chare, or Cheere, the first recorded pastor of the Baptist Church of Plymouth, and Abraham's life was on the mill when the lease was granted to Forstrete. Chare must also have had something to do with the Eastern Tucking Mill, a moiety of which was leased in the following year to William Bray, of Milton Abbot, fuller. This moiety previously belonged to Robert Bray, and the life of Elizabeth Laurence, late Elizabeth Chare, was on it. Thomas Bowden had the other moiety. Hence Mr. Burt was wrong in stating that the woollen manufacture was introduced here by a Mr. Shepheard, about the beginning of the last century, though under the Shepheard clan it certainly flourished to an extent unknown before. A baize manufactory was established by them; and less than a hundred years ago the cloth trade of Plymouth was at its height. It is now in this immediate locality utterly extinct; and the last textile manufacture that can be said to have really thriven here was the sail-cloth factory of Hammett and Dove.

I was very much struck on coming across a detailed account of the “ale and beer wyts” for 1624–5 to find that while the amount...
realized was only £25 6s. 3d., the number of persons "licensed to sell" was 134. The population of Plymouth then could not have exceeded 7,000, so that there must have been one ale or beer-house to every fifty inhabitants. And as if this was not startling enough, I found that in 1658-9, the first year in which there is any detailed entry of those who paid rollage and package, there were twenty-six brewers; or, assuming the population to have been 8,000, seeing that the effects of the siege could hardly have been recovered, one brewer to every 300. The numbers, it is true, gradually diminished afterwards; but what an enormous quantity of liquor must have been drunk by the good folks of Plymouth two centuries ago, to keep twenty-six brewers going, and to maintain 134 beer-houses (in 1661 there were only 102), besides four vintners; and all this in a town very little bigger than Tavistock now. However there is no reason here why we should look down as well as back on our ancestors. The explanation is simple. Coffee and tea were then unknown "down West; and if people did not drink beer—beer for breakfast, beer for dinner, beer for supper— they had no alternative except water, or some of those horrible decoctions of "yarbs," on the merits of which old women still wax eloquent, and which, if their virtues bear any proportion to their nastiness, must indeed be unapproachably excellent. It was stern necessity then, and not choice, that made the Plymouth folk of these days such liberal makers and drinkers of intoxicating liquors. Probably although the quantity was large the beer itself was small.

The brewers were, however, well under control. Guagers and ale-tasters were appointed, who had to see that the ale and beer made were good and wholesome, and without whose approval none could be sold. Moreover the price was fixed. In 1608 the best was ordered to be sold at 13s. 4d. per hogshead, and the second quality at 6s. 8d.; while in 1627, in obedience to the strong Puritan feeling of the town, it was ordered that no work was to be done by the brewers or their servants on the Lord's-day, "that they may wholly apply themselves to the attendance of religious duties as fully and freely as any others." Further, they were to sell no beer at a higher rate than 10s. a hogshead, which shows, however, a considerable increase in the prices of twenty years previous.

The only other local manufactures that can lay claim to antiquity
are felt-making (William Williams carried on this business in 1699); a sugar mill and refinery, in which the canes were ground, and which was in operation early in the last century; a salt refinery, so old that it was amongst the privileged in the reign of Queen Anne, when the erection of new refineries was prohibited except in places containing salt pits or springs; a paper mill, established at Millbay by Thomas Netherton in 1710; and a dye work, belonging to Abraham Joy, about the same period. I am also inclined to think there were potteries, but I can give no proof of their existence before Cookworthy set up the china manufacture.

And now for the internal trade proper. If we were to judge simply from the number of merchants whose names we find recorded during the latter half of the sixteenth century, this must have been very large indeed. We have nothing like such a show of merchants in Plymouth now, even in the modern acceptation of that much-abused term. The brewers were nothing to them. There are just fifty merchants whose names I have been able to recover from incidental mention in the town accounts; and to keep up anything like the same proportion to population, Plymouth ought to have at least five hundred now. These merchants, I fancy, were rather in the nature of general dealers and importers, shipowners, and the like. Probably the term included all engaged in trade who were not shopkeepers. The early merchants of Plymouth were fishermen; that is, they dealt largely in pilchards. In later times they found a mine of wealth in the Newfoundland fishery. Early in the last century they drove a considerable colonial trade. As our colonial possessions in the West Indies and in North America increased, so grew the trade of Plymouth; and in the years immediately preceding the outbreak of the French war in 1755, the Parade might be seen "full of hogsheads of sugar, rum, rice, tobacco, and every colonial produce." The custom house at that time was the old building on the south of the Parade, with the date 1632. This prosperity was put an end to by the wars which followed.

In the seventeenth century Plymouth had its first Exchange—erected by John Lanyon in 1673, on the New Quay, at his own expense. It was, however, pulled down in 1689–90, to be rebuilt at some future time. The careful Corporation, to preserve the lead thereof from embezzlement, sold it for £30 12s. 6d., and pocketed the money. Twenty years later the site was leased, and thus we
learn that Plymouth's first Exchange was 28 feet long from east to west, and 24 feet 3 inches broad from north to south.

I have no record of any strike; but among the miscellaneous papers preserved by Mr. Henry Woollcombe from the general wreck, is what looks very much like a lock-out—a declaration before Francis Pavey, Notary Public, of fifteen "Master Shoemakers and inhabitants of the borough of Plymouth," in general meeting assembled, that they "would only pay their journeymen the old rates of pay; and would not employ any journeyman who needlessly left his master, but with the said master's consent."

There is little to interest us in the markets of this period, beyond the fact that in 1652 a yarn market, which had been intermitted several years, was revived, and ordered to be kept in the churchyard weekly on Thursdays between 10 and 12.

The trade continued to be carried on in the old-fashioned protected way. I find in 1671-2 one Thomas Westcott presented for refusing to take an apprentice. Persons who were unfree were made to pay fines for leave to open their shop windows. Nor was this apparently considered enough in all cases; for in 1660 one John Norman, who had dared to set up the trade of an armourer in the town, not being an apprentice either of London or Plymouth, was protested against to the Corporation by James Roope, John Leland, Jn. Anderton, Nicholas Bickford, Thomas Bickford, Thos. Bickford, jun., A. Yoale, R. Fletcher, Wm. Jessopp, Jn. Burges, and Jn. Woodman. I have not the slightest doubt they got what they wanted; for they told the Corporation that Plymouth was "as ancient and as well governed in all particulars as most [boroughs] in England."

The shops of Plymouth town, in the year of grace 1678, might have been well stored; but we should not think them much to look at, could we be suddenly transported two centuries back. There was no George Street then, Bedford Street had not risen above its humble dignity of a Pig Market, and Old Town was almost wholly given over to Shambles. Whimple Street was the chief centre of business, whither the belles of Plymouth resorted to get the latest fashions, with an occasional excursus into High Street, or perhaps a turn round Southside Street and the Barbican, which could boast of their mercers and grocers, their goldsmiths and apothecaries, running Whimple Street rather hard, and being
THE EARLY COMMERCE OF PLYMOUTH.

by no means of the distinctly maritime character which now belongs to them. As to the gentlemen of Plymouth, I suspect they followed the ladies then as they do now, and confounded the shopping as vigorously as their successors. But they had some compensations. For example, there were the tobacco shops, which there is ample evidence did a good business. Letters patent had been granted for the exclusive sale of tobacco in Plymouth in 1634 to Thomas King, Abraham Briggs, John Adlington, John Wilcock, Nicholas Harris, Henry Honey, Richard Tapper, and George Rattenbury; London being the only place at which tobacco could be landed. The proof of the extent to which smoking was patronized is in the report of Garrard to Lord Stafford in 1663, that Plymouth had yielded £100 and as much yearly rent to the licensees, besides which there were many unlicensed shops which the magistrates had to put down.

And I dare say that while the ladies shopped, the gentlemen gossiped. So far as I am aware, Plymouth had but two barbers in those days. One, John Voysey, put forth his pole on the New Quay; but where his rival, John Addams, beautified his Majesty's lieges I cannot say. There were probably more, but these are the only ones whose names have been preserved, and so we must make the most of them. They were the newsmongers of those days. They knew whose ships had come home, and whose ships had not. They had heard, no doubt, how Master Nat. Northcott, the mercer, had got down such a fine lot of stuffs that his rival in trade, Master Allen, was unable to match them, and was jealous accordingly. Perhaps they had their complaints of the doings of Goldstone Langaller, son of a Frenchman, probably one of the refugee Huguenots; who was pushing into business as an apothecary, and so interfered with the barber chirurgeon's ancient prerogative of phlebotomy. And if not they, no doubt many of their customers, mightily approved the fining in 1663–4 of sundry butchers who had dared to kill bulls without baiting them, when the right of being baited had been one of the privileges restored to the bulls of Plymouth at the glorious restoration of the Merry Monarch. Either Voysey or Addams had his quip, we may be sure, for John Teape, when, in spite of the efforts of that worthy clockmaker, the Guildhall clock would not keep time; and I dare say Voysey thought it a move in the right direction when, in 1670–1, a dial was bought of John Bennet to put on the Barbican, especially as, with
the stone to put it on, it only cost £3 18s. Depend upon it, they heard before hand from their aldermanic clients all about the "large silver salver Cawdle Cupp and cover, embost and thick washed with gold," weighing seventy-five ounces, and costing £37 10s., which was given to John Sparke, one of the representatives of the town in 1679–80, "in token of the Respect and Gratitude of this Towne for his faithfull and diligent service." Sparke was the last member of Parliament for Plymouth but one who had anything for his labours. The last paid in cash before him were Christopher Ceely and Timothy Alsop, rewarded for their attendance under the Protectorate up to June 7, 1659; but so late as 1695 John Trelawny had one hundred guineas in consideration of his services to the town in Parliament. By 1710 the tables were turned, and the Corporation were not above taking £100 each from Charles Trelawny and Sir George Byng. It does not appear whether Joseph Willecocks, the goldsmith, found this "cawdle cupp;" and the gold wine fountain which now forms part of the Crown Regalia, and which was presented to Charles II. on his "happy Restauration," was bought in London by Timothy Alsop. Willecocks or his son, however, supplied sundry silver boxes to contain the seals of the honorary freedoms which the Corporation began to grant shortly after the commencement of the last century. Plymouth loved a lord mightily in those days. Never a notable came within hailing distance, but the Mayor asked him to dinner, and the town had to pay for it. The granting of the freedoms was an additional sign of polite attention, and not as a rule an expensive one, for the silver boxes did not average thirty shillings. It was a much more serious matter when, in 1736–7, the Prince of Wales was made free. Nothing less than a gold box would serve his turn, and for that Mr. Tolcher was paid £24 2s. 6d. All this must have been long after the time of our tonsorial friend on the New Quay, or his unplaced competitor, unless they came of the race of Old Parr. If either was alive then, however, I can fancy how delighted he must have been with the "four Indian kings"—who were they?—whom the Corporation entertained in 1709–10, and how he would have "admired" at the Prince of Chesroan, to whom £5 5s. was given as a "benevolence" in 1729–30, with 19s. for his travelling expenses to Liskeard!

It is much more likely, I think, that Voysey enjoyed the fun when "Babb"—an odd nickname for the Anne Lang to whom it
seems to have belonged—was ducked at the Barbican, and that he by no means begrudged the five shillings which the said ducking cost. And if either had a turn for art criticism, he certainly did not lack opportunity for exercising it. I hope Voysey and his customers duly appreciated John Lanyon's arms, painted by William Pearse for the New Exchange at a cost of £1 15s.; and that the portraits of Charles II., the Duke of York, and the Earl of Bath, placed in the Guildhall in 1684 at the cost of £16 2s., met with the approval of friend Addams and his clients. Judging by the portrait of Charles, I think they were cheap at the price. A dozen years later too Plymouth could boast a "lynner" of its own, Mr. John Hellier, who for drawing William III. "his picture at large," with a gilt frame, and repairing other pictures in the Guildhall, had £14. An extortionate price by comparison this must have seemed to such persistent shavers, though they may have been reconciled to the outlay by the reflection that it was encouraging native talent. Certainly Hellier was more expensive than Nathaniel Northcot, jun., who had £6 8s. in 1703 for the portrait of Queen Anne, gilt frame and varnishing other pictures included. Hellier was not above painting the guildhall and council chamber when they required it; nor did he refuse in 1715 to depict the town arms and trophies on the drum of the Town Militia.

And still assuming that we are doing our barber friends no injustice in regarding them as the Plymouth newsmen of these days, we may speculate whether they saw planted here the art and mystery that was to supersede this immemorial feature of their craft. Browne Willis says that Plymouth contained, circa 1715, two printing offices which subsisted "chiefly by publishing news papers." In September, 1721, Mr. E. Kent, of "Southside Street, near the New Key, where advertisements are taken in, and all other business relating to printing done as well and as cheap as in London or in any other place," started the Plymouth Weekly Journal or General Post. It died two years later; and was certainly not patronized in the way of advertisements by the Corporation. The first money the corporate body of Plymouth spent in printing, was in 1731-2, when they paid 18s. "for advertising the survey in the prints for setting the water-cocks." And two years later we find, "paid Mr. Smithurst and Mr. Jordain, for stamps, paper, and printing the water leases (the printing whereof 40s.), £15 9s. 6d. It was D[aniel] Jourdain who, in 1696, set up the first printing press in
Plymouth; and he is reputed to have been either a Huguenot refugee himself, or the descendant of one.

There are some interesting relics of the traders of Plymouth in the latter half of the seventeenth century, in the little tradesmen's tokens, issued "for necessary change," first during the Commonwealth, and through great part of the reign of Charles II. No copper money was at that time coined by the Government, and as silver pennies did not meet the requirements of trade, the tradesmen took the matter into their own hands. Probably altogether nearly 20,000 varieties appeared. Devonshire had about 400, of which 37 are known to have been issued in Plymouth, almost all farthings. The earliest is dated 1651, and the latest 1670. There are no rhymes or puns on any of the Plymouth tokens, as sometimes occur. They are all straightforward business productions, commonly with some device—the arms of the trades to which the issuers belonged, or occasionally the arms of the family of the issuer. The town arms also appear, and there are instances of the signs of the houses kept by the issuers. These tokens are as follows. Where three initials are given, the second is that of the Christian name of the issuer's wife:

<table>
<thead>
<tr>
<th>Legend</th>
<th>Field</th>
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<tbody>
<tr>
<td>Obv. Henry Clarke, Rev. Of Plimovth, 1667.</td>
<td>A Lion rampant. H.M.C.</td>
</tr>
<tr>
<td>James Cole was a brewer.</td>
<td></td>
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<tr>
<td>There was a John Cooke, a merchant.</td>
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<tr>
<td>This would be Oreston, still in common parlance Osan.</td>
<td></td>
</tr>
<tr>
<td>Obv. Henry Davis, Rev. Plymovth, 1669.</td>
<td>His half-penny. H.D.</td>
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<tr>
<td>There was a Richard Davis, a brewer.</td>
<td></td>
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</tbody>
</table>
Obv. Grace Elliott,  
Rev. Of Plymovth.  
There was a Mark Elliott, an apothecary.

Obv. Margret Eaton,  
Probably the widow of Christopher Eaton, mentioned as an apothecary in the Siege accounts.

Obv. Ivdith Ford,  
Rev. Of Plymovth.  
There was a Thomas Ford, a merchant.

Obv. Joachim Gevers,  
Rev. Of Plymovth, 1656.  
Poor Joachim must have died soon after this; for in 1638 Widow Gavers was carrying on business as one of the five vintners of Plymouth.

Obv. Edward Geffery,  
Rev. In Plymoth, 1664.  
There was a William Gefferie, a woollen draper; and a William Gefferie, hardly the same, had 17s. 6d. for painting the king's arms on the New Shambles at the Restoration.

Obv. Ralph Gordinge,  
Rev. In Plymouth  
One of the Gorges family, of St. Budeaux (?).

Obv. Christopher Hatch,  
Rev. Of Plymovth, 1658.  
I find a Philip Hatch, a farrier.

Obv. Michael Hooke, Grocer,  
Rev. In Plymovth, 1667.  
There was a Roger Hooke, a shoemaker.

Obv. James Ireish at ye  
Rev. Of Plymovth, 1667.  
Obv. James Jackson, at the  
Rev. Sunn in Plymovth, 1651.  
Mine host of the Sun tavern.

Obv. Will. Movntstevens,  
Rev. Of Plymouht.  
That Mountstevens was not a freeman, at least when he started business, we learn from an entry that in the year of issuing this token he paid for leave to open his shop windows for the four years preceding.

Obv. Samvill Northcott,  
Rev. Postma in Plymovth.  
Mayor in 1658, and ejected for refusing from conscientious scruples to give currency to a certain proclamation. Nathaniel Northcott was a mercer, and Nathaniel Northcott, jun., appears as an artist.

Obv. Roger Oliver, 1663,  
Obv. Edward Pateson,  
Rev. In Plymovth.  
Arms—a Chevron between three trees, each on a mount.
Thomas Payne was coroner some years later.

**Obv. Simon Paynter, of**
**Rev. Plymouth, 1657.**
Four Castles, two and two.

**Obv. Richard Perry, 1658,**
**Rev. In Plymouth.**
A Man making Candles.

**Obv. Henry Pike, at the Three**
**Rev. Cranes, in Plymouth.**
Three Cranes.

The Three Cranes was in Looe Street. Pike was a vintner, and was succeeded at the Three Cranes by George Bellew.

**Obv. Tho. Pike, at ye 4**
**Rev. Castles in Plymoth.**
The Plymouth Arms.

Undoubtedly the occupant of the Old Four Castles, still standing in Old Town Street.

**Obv. Iosias Pickes,**
**Rev. Plymouth, 1657.**
A foul Anchor.

Probably the father of Isaac Pickes, grocer, noted in 1693 as occupying a house in Whimple Street. Josias was a Baptist, and persecuted as such.

**Obv. Thomas Powell,**
**Rev. Plymouth, 1669.**
A wool comb.

**Obv. William Reepe,**
**Rev. Of Plymouth.**
1666.

William Roope or Reepe was a grocer; when he died his widow, Johanna, continued the business, but had to pay the Corporation for leave to open her shop windows.

**Obv. William Tom, Grocer,**
**Rev. In Plymowth, 1666.**
Arms of Tom family, three Buck's heads couped. Crest—a Cornish Cough.

**Obv. Adam Turtly,**
**Rev. In Plymowth.**
The Grocers' Arms.

Judith Turtly, widow, appears as a gunsmith and armourer in the Siege accounts.

**Obv. William Warren,**
**Rev. In Plymowth, 1656.**
A Fleece.

**Obv. William Warren,**
**Rev. In Plymowth.**
W.W. between four cinquefoils.

Warren was a vintner. He was the only one of the Plymouth issuers, so far as we are aware, who issued two tokens. When he issued the first he was married; when the second appeared he was a widower.

**Obv. William Weeks,**
**Rev. In Plymowth, 1659.**
A clasped Book.

Weeks was a stationer, and supplied goods to the Corporation.

**Obv. John Williams,**
**Rev. In Plymowth, Stationer.**
An open Book.
TIN.

ABSTRACT OF PAPER BY DR. R. OXLAND, F.C.S.

(Read December 6th, 1877.)

Dr. Oxland described and illustrated the physical and chemical properties of tin, its geological and mineralogical relations, the mining operations involved in the raising of its ores, the metallurgical processes employed in the preparation of the ores and the extraction of the metal, the purposes for which tin is employed in the arts and manufactures, and, in conclusion, gave some remarks on the effects of tin mining on the production of gold, and on possible improvements in reducing the cost of production and in increase of consumption.

THE CIVILIZATION OF INDIA.

ABSTRACT OF PAPER BY DR. WILLIAM H. PEARSE.

(Read December 13th, 1877.)

India, said the lecturer, was a nation allied to ourselves in race, language, and ideas. Superficial differences were obvious enough, but increasing intercourse and knowledge showed the deeper bonds. The study of early Indian civilization, and its beautiful poetry, opened up the natural history of the Hindu religion and philosophy, from the days of the personification of the greater phenomena of nature down to their varied incarnations, in which great truths and ideas were involved. The poetic Aryan-Hindu preferred personification to the colder moral and intellectual system of Buddha, even if it involved the cruel system of caste. Caste was a social institution in the main, and had helped, and yet helped, to form a great and good society and civilization; and there was danger to Indian society lest caste should too suddenly disappear.
Religious feeling penetrated Hindu society; and the Hindu Triad—Brahma the "creator," Vishnu the "preserver," and Siva the "destroyer"—had foundation in the order of nature. Juggernath—the god of the people, the lord of the world, before whom all men were equal, and caste disappeared—was one of the forms of Krishna, who was the eighth incarnation of Vishnu. The Hindu family system fostered early marriage, cemented society, and lessened vice. Wealth, or social status, did not lead the native into folly as to food or clothing; the general prevailing health and vigour of body was the result of simple food and natural modes of life. Art, as it existed in the middle ages in Europe, and yet exists, had but little place in India. The Hindu and Mussulman philosophies were in stages of generalization beyond the influence of art, and greater than any art. Western civilization was in true "continuity" with that of the East, as seen in race, language, mythology, and deeper method. Western nations had, since the time of the Roman empire, distorted Eastern writings, and closed out man's view of truth by a false method of "catastrophic" assertion. In this generation India and Europe were again meeting; Europe giving India precision in knowledge of facts and science, and India giving Europe a way to great harmonizing generalizations in method. The exact sciences, and the great generalizations in knowledge, of modern Europe, such as gravitation, correlation of motion and the "forces," evolution or development (as a series or rate), alliances and evolution of languages, &c., &c., would be absorbed by the Hindu mind, and appear in the method of his philosophy. Rapid changes and developments of great national importance were going on in India. Hindu women and the more earnest types of English women should know each other; those Europeans who best knew the Hindu and Mussulman were those who respected and loved them most. The religious and social life of Mussulman and Hindu must be better known: then it would be honoured. The discovery of Sanscrit and the Aryan mythology had influenced, and was vastly influencing, European method; heightening our knowledge of, and respect for, the East. The simplicity of life of the Hindu and Mussulman, in respect to food, drink, clothing, and general habits, should have vast influence for good on the European.
ENGLISH LITERATURE.

ABSTRACT OF PAPER BY MR. THOMAS CROGGE, F.R.G.S.

(Read December 26th, 1877.)

Commencing at the early dawn of English literature with the end of the Saxon Chronicle, the lecturer in succession reviewed the great fourteenth century and its master-minds; the Reformation period; the glorious Elizabethan era with its scholar-heroes; the pedantic learning of James the First's time, overswept by the Puritan wave, followed by the wild freedom of the Restoration; the latter part of the seventeenth century distinguished for the origin of a new literature; the golden age of essays; Pope the ruling spirit of a cold and formal, though polished and classic, school; the Johnsonian period, and the galaxy of great men which graced the eighteenth century; the dazzling advent of Scott's and Byron's writings; and concluded with some remarks upon English critics, and a sketch of modern literature.

THE FRIENDLY SOCIETIES OF DEVON AND CORNWALL.

ABSTRACT OF PAPER BY SIR GEORGE YOUNG.

(Read January 17th, 1878.)

The early history of the modern Friendly Society in England has not been traced backward beyond the middle of the seventeenth century. It has been shown, however, that there must have existed, during that century at all events, a considerable number. The attention of local antiquaries may perhaps usefully be directed to the obtaining from early records notices of such societies prior to the year 1793. By the examination of such records an interest-
ing link may yet be supplied, which is missing, to the connected history of the English people. It is desired to show how the habit of association for purposes of mutual help, among the working classes especially, survived the destruction of the religious gilds (A.D. 1545-1547), and was finally developed under its modern form.

Among the signs by which a hunt for such notices may be conducted are, the use of the word "box," as denoting the common fund; the custom of the annual "walk" to church, and the sermon; and the annual "feast," which are all very ancient. Of the first an instance is noticed of the form "sea-box" and "landsmen's box," in a northern seaport, as early as 1634; and it would be interesting to know if such an institution can be traced among our western seamen of the same period. Since 1793 the Registrar's office supplies a very full, though by no means a complete, view of the progress of these associations. Some curious records are there preserved of Friendly Societies founded previously to the first Enrolment Act. Extracts from the rules of these societies show that all the best known features of the Friendly Societies of the present day can be traced back to the infancy of their institution; and that they are indebted to modern legislation, not so much for any great assistance, as for the gradual removal of disabilities, which had been imposed on them by the suspicion or heedlessness of former legislators. The Report of the Registrar for 1875, published in 1876 (the last obtainable), contains a summary from which it will be evident that the average solvency of the West-country societies is very much above the general standard; while, compared with the population returns of the last census, it will appear that the proportion of the population who are members of these societies is not so satisfactory. Some necessary corrections must be made, in consequence of the peculiar character of the return for Lancashire; and when this is effected, the result is in each case brought nearer the general average.

All the usual forms of Friendly Societies are to be found in the West. The Affiliated Orders, especially the Manchester Unity of Odd Fellows, and Ancient Order of Foresters, stand first, as usual; Cornwall affords some special developments of the affiliated principle. One of the great collecting societies, the Rational, has an extraordinary popularity among the Devonshire villages. The Western Provident is a favourable specimen of the "patronized"
or "county" society. Local clubs are to be met with in the usual numbers, and under many varieties, though the type is dying out. The opportunities afforded to the Assistant Commissioners of the late Friendly Societies Commission (of whom the lecturer was one) will have led to the preservation of some pictures of these, which may hereafter be interesting. Burial clubs have also received some peculiar developments in the West. It is rather the fashion at the present day with public writers and speakers to weight their remarks in commendation of thrift, or of some special institution for its promotion, with sweeping assertions as to the absence of it, or diminution of it, among the Englishmen of to-day. The fact remains, that England is the one country where an organized system of thrift has been for centuries possessed by the industrial classes, elaborated by themselves, suited to their needs, and resulting in the possession by the generation at present representing them of a vast accumulated capital, held by them in trust for themselves and for posterity, to be devoted to the relief of unavoidable misfortune.

"THE LAWS OF NATIONAL PROGRESS."

ABSTRACT OF PAPER BY REV. J. ERSKINE RISK, M.A.

(Read January 24th, 1878.)

Evolution a Greek idea; Bagehot's application of the theory. Fuller explanation necessary of principles involved in the application of theory of evolution to political philosophy. True source of strength of nations. The two stages of civilization—custom and freedom. Social science possible or not? reasons for and against. Causes of error in social science, and means of counteracting them. The mental discipline required. Light thrown on the study by biological and psychological facts. Bagehot's and H. Spencer's interpretation of the science practically evolution in its most complex form.
It is not without considerable diffidence that I venture to present to the members of this Institution a sketch of John Prince, the author of the *Worthies of Devon*, because I cannot but feel my own inability to do justice to my subject, and place it before them in such a manner as shall give them a good idea of this worthy man, the times in which he lived, and the scenes with which he was surrounded. If it be necessary to apologize to a Plymouth audience for bringing before their notice a man not intimately connected with Plymouth, I would remind them that many of the heroes of whom he wrote were men who were natives of this town or its immediate neighbourhood, and that Prince in writing of Plymouth declares, "it is a port so famous that it hath a kind of invitation from the commodiousness thereof to maritime actions." It is strange that no biographical sketch of John Prince, or at least none of any length, should have appeared ere this, and that more than a hundred and fifty years should have been allowed to elapse since his death, without the life of the man who wrote the *Worthies of Devon* having been written. Indeed it would seem that the prophecy of his friend William Pearse, vicar of Dean Prior, which appears in the *Worthies*, has been almost fulfilled:

"You've done the work, sir; but you can't be pay'd
Until among those Worthies you are laid.
Then future ages will unjustly do,
To write of Worthies, and to leave out you."

This may, however, have arisen from the difficulty of obtaining particulars of general interest respecting him, for the editors of the 1810 edition of the *Worthies* give a sketch of his life occupying...
JOHN PRINCE. 341

only twenty-five lines, which was all they had been able to collect, "notwithstanding the most diligent search." The difficulty under which I labour in endeavouring, after a lapse of more than sixty years since that diligent but unsuccessful search, to collect particulars of this worthy Devonian, will therefore be readily understood.

John Prince was born at Newnham Abbey, in the parish of Axminster, in the year 1643; and speaking of his birthplace, he quaintly says, "The first parish towards the south-east of this shire (Devon) that way is Axminster, where, at the Abbey of Newnham, the author of this discourse, through divine mercy, breathed his first air." He was the son of Bernard Prince and Mary his wife, whose maiden name was Crocker, and was, through his mother, allied to the ancient family of the Crockers of Lynchem, in Devon; one of whom, Sir John Crocker, knight (who was cup-bearer to Edward IV.), has a place among the Worthies. In speaking of him Prince says, "There have been several other very eminent persons of this name and family, whom it may be thought tedious particularly to mention; only one there is whom, for his great loyalty to his prince, King Charles I., and this near relation I had unto him, being son to his brother's daughter, I may not pass over in silence;" and then proceeds to give a sketch of his great-uncle, Sir Hugh Crocker, Knight, who was a younger son and an Exeter merchant, and so successful that at one time he owned no less than ten ships, and in 1643 was mayor of the "ever faithful" city. It was during his mayoralty that King Charles I. came to Exeter, when pursuing the Parliamentary general the Earl of Essex. Having proceeded into Cornwall, the king on his return through Exeter knighted the mayor; a title which, Prince says, he was not ambitious of, and one which cost him much both in purse and person; for when the Royalists were overthrown, and those who had supported them had to compound for their estates, &c., his composition at Goldsmiths' Hall was £288; his brother-in-law, Sir John Coleton, of Exeter, knight, having to pay £244 10s.

In a recently published work, *Gleanings from the Municipal Records of Exeter*, there are some very interesting particulars respecting Prince's great-uncle. It seems that on the occasion of the visit of Charles to Exeter, £500 was presented to his majesty and £100 to Prince Charles, and the king was so delighted at the attention that he conferred the honour of knighthood on the mayor, Hugh Crocker; but at the same time it is unpleasantly hinted that
his majesty's army at Bristol was much in want of shoes—a hint something like a demand. Sir Hugh was a member of the Corporation when the city surrendered to Sir Thomas Fairfax, general of the Parliamentary army, on April 13th, 1646, and then commenced the troubles which cost him so much both in purse and person. First is an entry of his dismissal from the Corporation as follows: "Also that Mr. Hugh Crocker, for his manifest opposition to the Parliament; and his crueltie to those that were well-affected to their cause and proceedings, is dismissed of this Society." "Nemine contradicente." [This is in a different handwriting]. One of the members present, some uncompromising Republican and despiser of titles, takes the pen from the clerk's hand, draws a line through the title "Sir," and inserts "Mr.;" and, to give vent to his acrimony, adds at the end of the minute the words "nemine contradicente." Not content with this, they throw some doubt upon his integrity: "23rd June, 1646. Auditors appointed to receive the accounts that were of late made by Sir Hugh Crocker touching the affairs of this city, and to report to this house what is therein contained that they conceive not fitting to be allowed." Later on, when the Parliamentary party were still in power, a John Wilkins was committed to the sessions for refusing to assist the constables in ducking one Crocker's wife, perhaps the wife of the mayor knighted by King Charles. It is not unlikely, for Sir Hugh appears to have been in difficulties, and the most persecuted man in the city, though not without his friends. "12th July, 1653. Humphrey White, on hearing that the bailiffs were in Mr. Hugh Crocker's house, went in at the back door, and was attacked by Mr. Andrew, a bailiff, with a sword and pistol, and wounded in the arm. He also attacked and dangerously wounded another bystander, and finding matters getting rather hot for him fled, and left his sword behind him."

Prince says that the Crocker family seemed rather to have given to than have taken their name from the places with which they were connected; such as Crockern Tor, the seat of the old Stannary Court, Crockernwell, &c., for he goes on to say that they were "of the antient Saxon race, and were a considerable tribe in these parts before the Norman Conquest." "I have heard," he adds, "the present heir of the family, Courtenay Crocker, Esq., say, that when he was in Saxony he met some gentlemen of his name there, and they gave the same coat of arms as he doth;" a plain
argument, he considered, that they originally came out of that country. He also brings as a further proof, that “one of this house was wont to be free in his raillery with a certain gentleman who boasted much that his ancestors came into England with William the Conqueror, saying, ‘It was not much for his honour to be descended from those who came hither only to rob and plunder him and others of their lands and fortune.’” And of course the old rhyme must not be forgotten:

“Crocker, Cruwys, and Copplestone,
When the Conqueror came, were found at home.”

If any further evidence were needed of the high position of Prince’s mother’s family, I would only remark that when Prince wrote (1699) his relative, Courtenay Crocker, Esq., of Lyneham, was J.P. for Devon and M.P. for Plympton, and was connected by marriage with the well-known Devonshire families of Pollard, Strode, Elford, Champernowne, Pole, Hillersden, and Bulteel.

Of his father, Bernard Prince, I can glean nothing; not even his occupation or profession. I take him to have been a man of good position, and I find that his youngest brother Leonard Prince, uncle to my hero, was rector of Instow. In speaking of him, Prince says, “He was born at Nower, in the parish of Kilmington, in this county; descended from a knightly family of his name still flourishing [when he wrote] in Shropshire; bred at Oxford and at London; beneficed first at Ilfracombe, then at St. Johns in the city of Exon, and lately here [Instow], where he was buried about the year of our Lord 1695. He was a pious, powerful, practical preacher; much desired in his life, and much lamented at his death, which happened about the sixty-eighth year of his age.”

I have, I think, shown that Prince was of very worthy descent. Of his early life nothing is now known; but when only seventeen years of age he was admitted a student of Brazenose College, Oxford, this being in 1660, and in 1664 he took his B.A. degree and entered into holy orders.

Born in Devon, and closely allied to Devonshire families, to Devon he returns, and commences the active duties of his profession at Bideford as curate to Mr. Arthur Giffard. Bideford, with its famous bridge and stately quay, and its beautiful surroundings, were ever firmly imprinted on his mind; and when years after he sat down to write of the Worthies of that neighbourhood, he could not
help giving sketches of the scenes among which his heroes were born, and he had himself lived for four years; take for instance his description of Clovelly and Lundy Island, in his sketch of George Cary, D.D., Dean of Exeter.

It was in 1664 that Prince came to Bideford. Mr. Arthur Giffard, the then vicar, was presented to the vicarage of Bideford about 1646 by his kinsman, afterwards the Earl of Bath, but was dispossessed again about 1648; and both Prince and Dr. Walker give a very deplorable account of the way in which he was treated, and throw all the blame on his successor in the vicarage, William Bartlett. On the other hand Calamy goes into the charges very fully and, I think, fairly; entirely refutes some, and shows that as to others Mr. Bartlett was not in any way answerable for what was done. However that may be, it seems that both were very good and worthy men. In 1662 Mr. Bartlett, refusing to conform, was ejected, and Mr. Giffard came back again; but we are glad to know that he and Mr. Bartlett lived on very good terms, and that when dying Mr. Giffard desired to see and speak with Mr. Bartlett.

Prince being Giffard's curate, we must expect to find him very warm on the subject of his vicar's wrongs, especially as he was a strong Royalist himself; and he speaks of the sequestration as being "for no other crime than his loyalty and conformity to the Church of England (such was the iniquity of these times)." He describes Mr. Giffard as "an able scholar, a constant and painful preacher, an orthodox divine, and a pious, good man;" "this," he added, "I can testify, having served under him for several years before his death as a son of the Gospel."

I cannot but think that Prince's four years' training as curate to Giffard had a good influence on his future life and work. Mr. Giffard died March 18th, 1668, when Prince had been with him four years, and his curate was, among many others, as he says, "more able," chosen to preach the funeral sermon. So impressed does he appear to have been with his master's sufferings, and the freeness with which Giffard had forgiven his enemies, that he chose as the subject of his discourse the martyrdom of Stephen and his prayer for his murderers.

On Mr. Giffard's death Prince moved to Exeter, and, it is said, was chosen minister of St. Martin's Church. This can only, I think, have been as curate or assistant, as Dr. Walker, in his account of Robert Parsons, who was priest, vicar, and rector of St. Martin's,
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and was sequestrated, states that he lived to be restored to both his offices, and died about July, 1676. For seven years, however, Prince was curate or minister of St. Martin's.

While Prince was in Exeter, on Sunday, July 23rd, 1670, King Charles II. honoured the "ever faithful city" with his presence. Izacke says he reached Exeter "between seven and eight of the clock in the evening, having come down by sea to Plymouth to see the new citadel, and stayed in Exeter on his way home, and lodged the night at the dean's house within the Close." He was entertained at the city's sole charge, and presented with £500 in gold, which, Izacke says, "he graciously received, and expressed much favour toward the said city and knighted the mayor (Benjamin Olliver). The next morning early, about three of the clock, his majesty went hence. The king's short abode in the city hindred the great conduit at Carfoix from emptying herself of an hogshead of wine, which the city had provided in readiness for that purpose, and after his majesty's departure made a free disposition thereof for his service." Dr. Oliver, in his History of Exeter, referring to this visit, says: "As a testimony of his regard for the city his majesty promised to give the portrait of his sister and our townswoman, Henrietta, the Duchess of Orleans, who had died very suddenly at St. Cloud on the 29th of the preceding month. On this occasion he was," he adds, "as good as his word, and the picture is still to be seen in the guildhall." This hurried sojourn must have reminded Prince of the visit twenty-seven years before of the Merry Monarch's unfortunate father, on which occasion, as I have before mentioned, his great uncle, Sir Hugh Crocker, the then mayor, was knighted.

About the time of his going to Exeter Prince obtained the degree of Master of Arts from the University of Cambridge, having become a member of Caius College. In 1674, while at St. Martin's, he preached a sermon at the cathedral at the visitation of the bishop, Dr. Anthony Sparrow, which was afterwards published.

In April, 1676, Prince became vicar of the parish church of St. Mary, Totnes; but he had preached there for some time prior to that, for among the Corporation papers is an order to the mayor to pay Mr. John Prince, vicar of Totnes, 20s. for every Sunday or Lord's-day he preached before he entered into covenant with the Corporation. Prince succeeded Phineas Pott on his cession.

The original covenant, bearing date December 13th, 1675, and executed by Prince, is still among the Corporation documents
in the old guildhall at Totnes; it is endorsed, "Mr. Prince's Articles," and it is stated to be made between the Mayor and Burgesses of the Borough of Totnes, and John Prince, of St. Martin's, in the city of Exeter. It recites a verbal agreement having been made between the Mayor and Burgesses and Mr. Prince, concerning the paying him a salary of £50 per annum, for officiating in and exercising of the office of vicar or minister of the word of God at Totnes, for the term of seven years; and the Corporation accordingly agreed to pay him that sum by quarterly payments, and further, to procure at their cost a presentation, institution, and induction of Mr. Prince into the vicarage of Totnes, and to keep him indemnified from charges for dilapidations concerning the vicarage-house, and from all tenths and other duties. Mr. Prince covenants that he will permit the Mayor and Burgesses to receive and take the rents and profits of the vicarage-house and gardens thereunto belonging, and the dues payable out of the rectory of Totnes, and the benefit of all gifts for the vicar and such person as should be lecturer or curate. The cost of induction, presentation, and first-fruits, paid by the Corporation, amounted to £35, as appears by a paper pinned to the agreement.

In 1675 the old town of Totnes must have presented to John Prince, when first he came to supply its church, a very different appearance to what it does to the tourist of to-day; though it yet retains a great many of those architectural features which remind us of its former importance, and which have caused a member of this Institution, in his Plea for the Picturesque in our Devonshire Towns, to fitly call it "the Chester of Devon."

When Prince came to Totnes, its four ancient gateways (only two of which now remain) were all standing; and one of these, the east gate across the main street (yet extant), had then its carriage-way and its "needle's eye" for foot passengers. The rows or piazzas were longer than at present, some part having been destroyed—rows beneath which the "hose of fine Totnes," celebrated in romance, was sold, and under which at fair-times the dealers from all parts exposed their wares. Its old walls too could be traced to a greater extent than now. There was, I think, one object he could look on with much veneration, and one which to-day presents much the same appearance that it did two hundred years ago; viz., the keep of the castle of Judhael de Totnes, which in Henry VIII.'s reign is referred to by Leland, who says: "The
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castelle waul and the stronge dungeon be maintained, but the logginess of the castelle be cleane in ruine;" and in Prince's sketch of Sir R. Edgecombe, Knight, he refers to the castle of Totnes as having been the property of the Edgecombe family, and says: "This was given at first by William the Conqueror unto Judhel, a noble Norman surnamed from this place 'de Totnes,' where he seated himself in the castle of his own constructing, now long since demolished, there being little more of it than the walls 'left' standing."

Crossing the Dart, then "nigh choaked with tinny sands," and connecting Totnes and the adjoining parish of Berry Pomeroy (of which Prince was the vicar for forty-two years) was the old picturesque bridge, dating from King John's reign, with its eight arches, and at that time in some parts only four and a half feet wide; and connected with the old bridge is an incident on which Prince founded two sermons, to which I shall have occasion to refer by-and-by. As to the Dart, why it was famous then as now for the beauty of its scenery, the rapidity of its stream, and the regularity, as tradition says, with which it claimed its yearly victim. The local rhyme still runs thus:

"River of Dart, oh river of Dart,
Every year thou claimest a heart!"

A couplet on which Mr. Mortimer Collins, a Plymouth-born poet, founded his short poem "River of Dart."

I can almost fancy Prince in the old guildhall and council chamber (still existing and very little altered), with their linen-pattern panelling and curious cornices (almost the only remains of the priory founded by Judhael), arranging with the old burghers, the members of the Corporation, the terms on which he should serve the parish church, when they came to the verbal agreement before referred to; and I am sure, lover of the antique as he was, he could look with veneration on the old Roman foss-way; the last remnants of which have, I regret to say, in my time almost passed away, but which then extended right into the town. In the account of John Row, serjeant-at-law, we get from Prince's own pen a sketch of the old town: "Row, John, serjeant-at-law, was born in Totnes; a sweet and pleasant town situate on the ascent of a hill lying east and west a mile in length upon the west side of the river Dart, which proceedeth from Dartmoor, and
which was heretofore navigable up to this towne, and still is by small boats and barges with the help of the tide which floweth nearly a mile above it. A town famous in history for the landing here of the Trojan Brute, the founder of the British nation according to the opinion of antient writers, but of late years ridiculed by many learned men as fabulous. There is yet remaining towards the lower end of the town a certain rock still called Brute's Stone, which tradition here, more pleasantly than positively, says is that which Brute first put his feet upon when he came ashore. This neat and clean town standeth eight miles to the north-east of Dartmouth, and twenty miles to the south-west of Exeter. It was sometime walled about, as appears by the gates yet standing, made a Corporation by K. John, enabled with many immunities by K. Henry 3rd, and sendeth two Burgesses to Parliament. Of so great consideration was it heretofore that the shore adjoining was thereof called Tottonesian Littus. But hereof let not this be thought too much.”

Nor do I think that I am drawing too much on my imagination in supposing that the architectural remains to which I have referred, and the grand history of the old borough, may to some extent have influenced Prince in accepting the vicarage without the vicarage-house for the small sum of £50 a year. And if this was so, the beauty and associations of the building he was to minister in must have strengthened his determination, for the parish church of St. Mary, Totnes, of which Prince now became the vicar, must at that time have been a noble building. It had not then suffered at the hands of the eighteenth century churchwardens, who disfigured it with huge and unsightly galleries, cutting away the stonework of its handsome columns to fit their work into, and white-washing the pillars and walls and one side of its magnificent stone screen. Nor had the baldachino, so out of place, been then erected in the chancel. There were to be seen also many curious epitaphs and brasses which have long since disappeared, but some of the inscriptions on which, thanks to Prince, have been preserved. The original handsome carved-wood ceiling was likewise in existence, the portion in the chancel having been removed only about sixty years since.

I can well imagine the delight with which Prince must have viewed his noble parish church, some portion if not all the chancel of which must date at least from the thirteenth century, and parts of which may have been the remains of the church which Judhael
de Totnes, the Norman (favourite of the Conqueror), granted to the great Benedictine abbey of St. Sergius and Bacchus at Angers, described in his charter as "ecclesiam Sancte Marie de Totenes."

The main building, however, dated from the fifteenth century, and seems to have been the conventual church of the priory of St. Mary, founded by Judhael. Being connected with the priory, the vicars were presented to the living by the prior and convent, until the suppression of the monasteries, except when our sovereigns seized the temporalities of this alien house during the wars with France. From Edward IV.'s reign the presentations were made by the Crown, but virtually by the Corporation, whose recommendation seems to have been accepted by the sovereigns, as the Corporation had to find the vicar's stipend, there being no small tithes, and the great tithes being in the hands of a layman.

To a literary man like Prince there was one thing in the church which attracted his attention, and this was the library in the parvis. Near the south entrance is an arched stone door-way in one of the side aisle seats, through which access is obtained by means of a winding stone staircase to the parvis or small room over the porch, in which is still stored over three hundred volumes, nearly all of which are very old, the greater portion having been printed before the commencement of the eighteenth century. In 1619 one Gabriel Barber delivered to Mr. Richard Lee, Mayor, £35, whereof £10 was to be employed towards the procuring of a library; and it is evident that from this gift this library originated. From the following entry in the accounts of Philip Ley, Mayor of Totnes 1645–46, it seems that this parvis was the original place in which they were kept: "1646, July 20. P4 for removing the books from the church porch to Mr. William Tillard's house" (a member of the Corporation). This removal was in troublous times, and just before the occupation of Totnes by the Royalist army under Lord Goring, and the removal was no doubt for safety. It is not merely a guess which notes the interest that Prince felt in this library, for I find in the town accounts entries which show that he looked after its preservation: "1676. Paid Mr. Prince for carriage of some of the library bookes from Exon here which ware new bound, 2s. 6d.;" and in the same accounts are entries of expenses on the library, and among them: "P4 Mr. Prince for binding the books, £2 10s.; for marking the books and gold, 8s. 2d." They are all marked "T. C." in gold letters. Unfor-
tunately the same care has not been taken of them of late years. Subsequently they were placed on shelves in the old vestry, which was destroyed during the recent restoration of the church, and they were then taken back to their old place in the parvis.

Among the books in the library are the following very valuable works; viz., Walton's celebrated Polyglot Bible, in six volumes (London, 1660), Paraphrases of Erasmus (1534–1551), the Works of St. Thomas Aquinas (London, 1586), Calvin's Works (1573), Annals of England—Henry VIII. to Elizabeth—(London, 1630), Castelli Lexicon Heptaglotta (London, 1669), Sir Walter Raleigh's History of the World (1614). It appears from a catalogue made some years since by Mr. Cleave, curate of Totnes, that there were then over three hundred volumes. Some are still in fair preservation, but others are in a very bad state, and if allowed to continue uncared for must soon be destroyed by decay.

The bells also received Prince's attention, for I find that in 1680 the whole or some of them were re-cast, being taken down and removed to the old Maudlyn chapel (the lepers' house), where the bell-founder, a Mr. James Buckley, did his work, and was afterwards treated to the extent of 6s. 2d.

Leaving Exeter and settling in Totnes, Prince came from a strong Royalist city to a Parliamentary town; for during the troubles of the Civil War Totnes showed itself far more favourable to the Parliament than to the King. But in 1662, thirteen years prior to his arrival, the church had been purged of its Presbyterianism by the ejection on the death of the vicar, Mr. Garrett, of his curate, Francis Whiddon, M.A., one of the Whiddons of Whiddon Park, Chagford. So pronounced had been the Presbyterianism that on this ejection it was necessary, as appears by the town accounts, to purchase vestments and books for the use of the new Episcopalian vicar, Mr. Ford. The entries are as follows:

"1662, October 22.
Payd for Serplis (surplice) for ye Minister and Clerk £7 1 6
Payd for cloth for the Communion Table . 1 17 6
Payd for a napkin for the same . 0 0 11
Payd Mr. Teape for a Book of Articles . 0 2 0
Unto Thomas Ellis for mending the faunt . 0 6 0
For a chest and lock and key to keep ye vestments . 0 6 6
Unto Mr. Teape for a Church Bible . 3 0 0
For a Book of Commons and Marriages . 0 2 0
16 yards of Matting for the Chancill, 3d. per yard . 0 4 0
Unto Savery Hutchings for a deske to put ye Bible on . 0 10 0"
So Prince found his church duty fitted for worship according to Episcopalian rites, but at the same time he found in the town a strong body of dissenters, ministered to by Mr. Whiddon. Francis Whiddon was great grandson of Sir John Whiddon, knight, Justice of the King's Bench, and one of those Devonians who finds a place among the "Worthies." If we take only his opponent's estimate of this Nonconforming divine, we learn that he was a man of high integrity, and one in whom Prince would find a formidable rival. He has the honour of being one of the first of the two thousand ejected ministers, for on the death of the vicar of Totnes, Mr. Garrett, he was by the churchwardens and magistrates ejected before his brethren on June 22nd, 1662. His appointment had been by the Corporation, who agreed to pay him £100 a year; double the sum that Prince afterwards obtained. He continued in Totnes after his ejection, and lived on good terms with his successor, Mr. Ford, and frequently attended the parish church. He however gathered a congregation together, preached twice on Sundays, and held two weekly lectures at Totnes and one at Bowden—the residence of Dr. Burthogge, a leading Nonconformist, about a mile from the town. In 1671, a minister expected at Totnes church not coming, Mr. Whiddon was requested by the mayor and senior magistrate to preach there, which he did; a young man of his acquaintance reading prayers. To avoid the displeasure of Dr. Anthony Sparrow, then Bishop of Exeter, Whiddon went to London and begged the king's pardon, which was granted, and the prosecution ordered to be stopped.

On two or three occasions he and his hearers were indicted at the Assizes at Exeter, but the bill was thrown out, chiefly, it is said, through the influence and arguments of one of his relatives who was on the grand jury. One of the mayors usually attended Mr. Whiddon's ministrations, and in the old court books, from and after 1675, are continual entries of presentments of persons, including Mr. Whiddon, Mrs. Shapleigh (the wife of a magistrate), Robert Babbage (ancestor of Charles Babbage, the inventor of the calculating machine), Dr. Burthogge, Christopher Furneaux (ancestor of Dr. Philip Furneaux, the Nonconformist divine), and many others, leading people of the town, for non-attendance at church for three consecutive Sundays. On one occasion as many as thirty-nine persons are presented at one time. Curiously enough the presentations begin just when Prince first comes to Totnes,
but I do not for a moment attribute this action to him; for, strong Episcopalian though he was, he knew how to honour true worth when he saw it; and Calamy says Prince informed him that Mr. Whiddon left behind him the character of a curious preacher and a most genteel, friendly, and courteous person. On Whiddon’s death, in September, 1679, while Prince was vicar of Totnes, Prince allowed the rector of the neighbouring parish of Diptford, a relative of Whiddon’s, to preach his funeral sermon in Totnes Church, “before the mayor, aldermen, and inhabitants of the populous town of Totnes,” I give his own words, “with several justices of the peace and ministers of the county, both con. and nonconformists, in which he gave him a very honourable character; and the sermon, it is said, met with general approbation; and at its close he said, Of late one pulpit hath not held us; but I trust in due time one heaven shall, where there is no discord in the saints’ harmony, where Calvin and Luther are made friends.” Might not some in this enlightened nineteenth century, which boasts of its civil and religious liberty, with advantage copy the example of some of the Conformists and Nonconformists of the seventeenth century, who, whilst holding firm their own opinions, could recognize and respect the good qualities of their opponents. I cannot help admiring John Prince as I read his denunciation of the Puritans who occupied the pulpits of the sequestered Episcopalians, and remember how, when he came to Totnes, he could admire the character of the Nonconformist divine who had occupied the pulpit he then filled, and was ready on his death to allow the funeral sermon for the holder of conventicles to be preached in his parish church, while he granted a place among the “Worthies” to Dr. Theophilus Gale, the Nonconformist divine, whom he considered a very learned man, though he looked upon his Nonconformity as a great misfortune of his life.

On reference to the registers of Totnes Church during the period Prince was vicar, I found that they were at first very illegible, but after a while the following entry occurs, which shows that the worthy vicar took this matter in hand: “Dec. 26th, 1680. This register was taken into the hands of ye minister and churchwardens. Nicholas Oliver, churchwarden.” The writing then became very plain and legible. No doubt before that time it had been left to some illiterate parish clerk.

From one of his published sermons we glean the account of a
curious incident connected with Totnes. The sermon was published in London in 1709, is entitled *Self murder asserted to be a very heinous crime*, and contains an account of the rescue of a woman who threw herself over the bridge at Totnes, near twenty feet high, into the river. This woman was the wife of the sexton, and on a Sunday she, being as Prince thought tempted by the devil, got her daughter to go with her for a walk as far as Totnes bridge. It was in the winter (January 25th, 1707), and a large quantity of water was running down the river. Stopping to look over the parapet, she suddenly, without warning, leapt on it, and from thence into the river. Her daughter strove to save her, but was pulled over by her mother's weight, and both fell into the water. And then comes the marvellous part of the story, for they both fell on a bank of sand before unknown, which seemed to have appeared on purpose to save them, and stood safely there till rescued by a boat. Prince makes this incident a text on which to preach against the sin of suicide. He speaks of it as a story well attested, yet hardly to be paralleled in history, and in the sermon gives many necessary instructions how to avoid a sin of this nature.

From his evident strong belief in the almost miraculous appearance of the bank of sand in question, and from passages scattered through the *Worthies* I cannot help being impressed with the fact that Prince was to some extent a superstitious man. In his account of George Monk, Duke of Albemarle, he refers to the death of his companion, General Dean, in a fight with the Dutch, and says, "in whose death there happened something so remarkable, that it may be worth inserting. This Dean, the night before he was killed, the rats had torn and devoured all the parts of his doublet on the left side where he was shot with a cannon bullet. And his own spirit was much sensible of his approaching fate; for though he was a Beemest in religion, yet he retired for two hours to some private devotions (which was not usual with him) the morning before his death; and those who observed him then, he being valiant enough, saw death in his face."

And again, referring to General Monk's march to London after Cromwell's death, he says, "Mr. Scott and Mr. Robinson, two members of the House, were sent down to meet and attend the General. In the journey these two gentlemen, sitting opposite in
the coach, upon some great concussion and descent in the road, their heads so beat one against the other that Mr. Scott's head fell a bleeding in the fore-part, that to staunch it they were forced to call for a chyrurgeon of the army, and make some stop for his application. This was observed as ominous to that gentleman's [Mr. Scott's] future execution." Other references might be given; but these will, I think, suffice. And whilst referring to this characteristic, it is well to remember that there were many in his day who were superstitious, and that the race has even in the nineteenth century not died out.

The references to Prince in the Totnes documents are very meagre. It appears, however, that the impartial jury of the Court Baron of Totnes did not hesitate in their presentments of 3rd April, 1678, to present for bad pavement outside their houses, among others the vicar himself, Mr. John Prince. In October, 1676, a few months after Prince's settlement in Totnes, the Duke of Albemarle was expected to pass through the town; and a messenger was on the 2nd of that month sent to Plymouth to wait on Sir Edward Seymour, "to know the moving of the Duke;" on the 4th (two days after) two more messengers were sent "to seek the Duke with a letter to desire his stopp here." Persons were paid to be at Brent Hill "to view the coming of the Duke, and give the town notice;" and on his arrival, he and his followers were entertained by the Corporation at a cost of £17, and the ringers were treated with beer. There can be no doubt that the worthy vicar, who was soon after to write in the most laudatory terms—terms far too laudatory—his sketch in the Worthies of George Monk, Duke of Albemarle, would be one of the foremost to welcome to Totnes his son, who, like his father, held the Lord Lieutenancy of Devon, and to assist the Corporation in entertaining their illustrious guest.

In 1677 the Bishop of Exeter, Dr. Sparrow, held a visitation at Totnes, and messengers were sent by the Corporation to Lady Seymour to "know her mind touching ye entertainment of ye Bishop;" and the treating this worthy divine cost £10.

Prince remained vicar of Totnes until the early part of 1681, when he resigned, having been appointed vicar of the adjoining parish of Berry Pomeroy, the gift of Sir Edward Seymour, Bart., of Berry Castle, owing this promotion (the living of Berry being far better pecuniarily than that of Totnes) to the connection
existing between the borough of Totnes and Sir Edward, who was recorder. He was succeeded in the vicarage of Totnes by Robert Burscough, who seems to have hailed from the North, his being a Lancashire name.

Prince in the *Worthies* speaks of him as his "very kind and friendly neighbour the reverend and learned Mr. Robert Burscough, Vicar of Totnes, my immediate successor in that charge." I am inclined to think that it is not improbable but that to this change from the busy town to the quiet village, with its small population, we owe the *Worthies*; for here Prince must have found far less to engross his time and attention, and whilst not neglecting his pastoral work, could employ his spare time in perfecting the idea, which had many times run through his brain, of printing for the good of his county a collection of many things of good note respecting the men of Devon.

The parish of Berry Pomeroy, then as now, was almost entirely the property of the noble family of Seymour; and its name carries us back to still earlier days, when the "Castle of Berry" was the stronghold of the Pomeroys, one of whom, Sir Henry Pomerai, Lord of Biry, is immortalized in the *Worthies*, while the Seymours have no place in the list of illustrious Devonians.

Of the castle, still sought out by tourists and antiquaries, it will be well to transcribe Prince's account. He says: "It may not be ungrateful to give a brief account of their [the Pomeroys'] antient habitation. It was a castle standing a mile distant toward the east from the parish church of Biry aforesaid. What it was in its antique form can hardly be calculated from what at present remains standing, which is only the front, facing the south in the direct line of sixty cloth yards in length. The gate standeth toward the west end of the front, over which, carved in moorstone, is yet remaining Pomeroys arms. It had heretofore a double portcullis, whose entrance is about twelve foot in height, and thirty foot in length, which gate is turreted and embattled, as are the walls yet standing home to the east end thereof, where answereth yet in being a tower called St. Margaret's, from which several gentlemen of this county anciently held their lands. Within this is a large quadrangle, at the north and east side whereof the honourable family of Seymour (whose possession now it is) built a magnificent structure, at the charges, as fame relates it, upward of £20,000, but never brought it to perfection; for the
west side of the quadrangle was never begun. What was finished may be thus described. Before the door of the great hall was a noble walk, whose length was the breadth of the court, arch'd over with curiously-carved freestone, supported in the fore part by several stately pillars of the same stone, of great dimensions, of the Corinthian order, standing on pedestals, having cornices or friezes finely wrought, behind which were placed in the wall several seats of frieze stone also, cut into the form of an escallop shell, in which the company when a weary might repose themselves. The apartments within were very splendid, especially the dining-room, which was adorned, besides paint, with statues and figures cut in alabaster with admirable art and labour; but the chimney-piece of polished marble, curiously engraven, was of great cost and value. Many other of the rooms were well adorned with moldings and fret-work. Some of those marble clavils were so delicately fine that they would reflect an object true and lively from a great distance. In short, the number of the apartments of the whole may be collected hence, if report be true, that it was a good day's work for a servant but to open and shut the casements belonging to them. Notwithstanding which 'tis now demolished, and all this glory lieth in the dust, buried in its own ruins, there being nothing standing but a few broken walls, which seem to mourn their approaching funerals. But what we may think strangest of all is, that one and the same age saw the rise and fall of this noble structure."

The church in which Prince now ministered was far inferior to his church at Totnes, but still it was not without interest. He speaks of it as "an handsome, compact, although not large, pile," and refers to its having been founded by the Pomeroys, "whose coat-armour," he says, "is tinged in the glass of several windows thereof, with their matches remaining still plain and visible to the eye."

Berry Church appears to have been built in the latter part of the fifteenth century. It consists of chancel and nave, with north and south aisles, which are divided from the nave by five arches supported upon clustered columns with carved capitals. It appears to have been built, or rather rebuilt, by Sir Richard Pomeroy, the south aisle being at the same time added by various persons of standing in the parish and neighbourhood, whose names appear in the capitals of the southern pillars carved in the stonework.
The inscriptions are as follows:

"Et pro omnibus benefactoribus hujus operis orate.

Ricardus Toudor, Alyn uxor ejus
Varlet (?) Tailor, Deonis ux. ei.
Edwardus Lane, Johanna uxor ei.
Ricardus G'wan (?), Alys uxor ei.
Johes Godrogge, Withan uxor ei.
Johes Oldereve [the remainder of this portion of the inscription (if any) is hidden by the screen which surrounds this pillar]

Johes Goderofy, Isabel uxor ei.
Johes Letin, Alys uxor ei."

Which may be translated:

"And pray for all benefactors of this work.

Richard Tudor, Alice his wife
Varlet (?) Tailor, Deonis his wife
Edward Lane, Johanna his wife
Richard G'wan (?), Alice his wife
John Goodridge, Wealthy his wife
John Oldereve
John Goodridge, Isabel his wife
John Letin, Alice his wife."

These pillars were a good deal out of the perpendicular, but have recently been restored to their proper position. The porch has a finely-groined ceiling supported on slender circular shafts, and on one of the carved bosses are the Pomeroy arms.

On the north side of the church is an old altar tomb, on which were originally effigies and brasses, now removed; this appears to have been the tomb of Sir Richard Pomeroy, before referred to as the probable rebuilder of the church. In the north chancel chapel is a large Corinthian monument to the memory of Lord Edward Seymour (son of the Protector Somerset), who died in 1593, with his effigy, and those of his son, Sir Edward Seymour, Bart., and his wife and eleven children.

The church also possesses a very handsomely-carved screen, the side of which towards the chancel has however lost its original elegant colouring, and has been grained. It has been a good deal mutilated, but on the panels at its base can still be traced the representations of many saints. The pulpit is of the same date as the screen, and the tower, which contains four bells, is square and embattled. On the western side of the south porch is an old slate sun-dial, with the date "1687" carved on it, having been erected while Prince was vicar.
I may be allowed to express the hope that funds may readily be obtained to restore this fine old church, and to erect in it some memorial of John Prince, for forty-two years its vicar.

It has been a subject for conjecture how it happens that in the *Worthies* there is no reference of consequence to the Seymour family. The absence of such reference struck me very forcibly in a perusal of that work, and knowing a little of what historians tell us of the proud and overbearing Edward Seymour, who in 1688 succeeded to the baronetcy, and was therefore during the greater part of the time Prince was vicar of Berry lord of nearly all the parish, I could not help feeling that Prince and he had not worked well together. Mentioning this to a relative, I was confirmed in my view by her statement that her father and uncle, for many years resident in Berry parish, had told her that there was a feud between Prince and the Seymours. Nor can I think it a matter for surprise that the straightforward and honest cleric could not agree with the man who, although on a level with the noblest subjects of Europe, of large fortune and extensive influence, one of the most skilful debaters and men of business in the kingdom, and almost the first member not a lawyer called to occupy the Speaker’s chair, was, according to Macaulay, of haughty and unaccommodating temper, licentious, profane, corrupt, too proud to behave with common politeness, yet not too proud to pocket illicit gain—a man who showed his characteristic pride when at his audience with the Prince of Orange at Exeter he conducted himself so as to surprise and amuse the prince. “I think, Sir Edward,” said William, meaning to be very civil, “that you are of the family of the Duke of Somerset?” “Pardon me, sir,” said Sir Edward, who never forgot that he was the head of the elder branch of the Seymours, “the Duke of Somerset is of my family.” From his likenesses we see that he looked what he was, the chief of a dissolute and high-spirited gentry, with the artificial ringlets clustering in fashionable profusion round his shoulders, and a mingled expression of voluptuousness and disdain in his eye and lip. And yet he was a courageous man, and not afraid to stand up in the House and hold language for which any other man would have been sent to the Tower. This was hardly the man, I think, to get on well with honest John Prince, the sturdy Royalist and Episcopalian.

Shortly after Prince’s settlement at Berry occurred Monmouth’s Rebellion, followed by the Bloody Assize. During this assize
Richard Coffin, of Portledge, was Sheriff of Devon; and in the letters of his Under-sheriff, Thomas Northmore, of St. Thomas, Exeter, are graphic accounts, first, of the orders of the Lord Lieutenant to the Sheriff on the rebellion breaking out, June, 1685, and in August and October of the same year, of his (the Under-sheriff's) journey to Wells, where he meets Jeffreys, to try and save his master what he could "of the extraordinary charge of whipping and executing the prisoners," wherein, he says, he "got some mitigation." Quarters and heads of the rebels were, however, ordered to be sent to Honiton, Axminster, Barnstaple, Torrington, Tiverton, Plymouth, Dartmouth, and Totnes; and when Prince came into Totnes he would see the ghastly relics exhibited as a warning to all who might in future be inclined to rebellion.

News of Monmouth's landing must quickly have reached Totnes. He landed at Lyme on the 11th of June, 1685; and I find in the Corporation Book an entry, under date 19th of June, to the effect that Samuel Hyre, of Totnes, brassier, was bound over "For reportinge that he had received a letter from his father (a lieutenant in the King's army against Lyme), wherein was said that the Duke of Monmouth had 12,000 men;" and two days before the battle of Sedgemoor was fought, and the rebellion crushed (viz., on the 4th of July, 1685), one Joanna Punchard, of Totnes, spinster, was bound over "For declaring that she did not care who was king soe she enjoyed her religion."

Prince, as a strong Royalist, would, I think, look on Monmouth and his followers as blind enthusiasts, or worse; in fact he refers to Jeffreys and the Bloody Assize in the coolest terms possible, comparing it with Judge Whiddon's Assize in the North of England for the trial of those who rebelled against Queen Mary; and he would no doubt congratulate himself that he had retired from the borough town which he could not but remember had sided with the Parliament in the Civil War of forty years before. On this occasion Totnes furnished at least one recruit to the Duke of Monmouth, and it may have been more. The one we know of appears to have escaped detection, and not to have fallen into Jeffreys' hands; but his father, James Cole of Totnes, shoemaker, was bound over "for conveying away James Cole, his son, who was in the rebellion with Monmouth." Totnes too sheltered from Jeffreys one of the "fair maids" of Taunton who helped to work Monmouth's banner. This young lady found refuge in the house.
of an ancestor of mine engaged in the woollen trade, a business which brought him into connection with the traders of Bristol and Taunton, hence her being sent to him. She was hidden in a room in the roof of his house in Fore Street, Totnes, and this room could only be got at by a ladder, which was removed when not wanted. Her being there (so great was the danger) was known only to the heads of the house, who at night took the poor girl's food to her, and there she remained until the storm had somewhat blown over.

Even in his quiet vicarage at Berry, Prince could not help seeing the signs which showed unmistakably that, though Monmouth's rebellion had been crushed, James sat very insecurely on his throne; signs which, as time wore on, were not wanting in his immediate neighbourhood; for in December, 1687, an order from the king was received by the mayor of Totnes dismissing Sir Edward Seymour, Baronet, from the recordership. This was the Sir Edward who had presented Prince to the living of Berry, and the father of the proud Speaker. The order to the mayor and corporation was not alone for the removal of Sir Edward, but was accompanied by a letter requiring them to elect Sir John Southcote, a Catholic, in the room of Sir Edward, without administering to him the usual oaths, which were dispensed with. The old burghers of Totnes were not however to be intimidated, even by a king, and out of thirty-nine members of the corporation present only four voted for Sir John Southcote, thirty-three against him, and two were neutral. Among those who voted against were all the leading men in the borough, including the mayor, and several who had before filled that office. This conduct was not allowed to go unpunished. The greater number of those who voted against Sir John Southcote were, by order of the king in council, removed from office, their places being supplied by, among others, several Dissenters, and a new charter was granted, in which Sir John Southcote was nominated as recorder. A few months after, when James began, too late, to see his mistakes, this charter was withdrawn, and the old one given back again.

Prince could not, I think, have been an uninterested observer of events, of such great moment to the realm, which were taking place around him, and he must have been troubled by all he saw happening. It was only a few miles from his vicarage that the Prince of Orange landed; and tradition says that the Prince had a meeting with Mr. Edward Seymour in a house, now a cluster of
labourers' cottages, on the borders of Berry parish, still called
Parliament House. Another story describes the meeting-place as
near a hill, now called Parliament Hill; but wherever it may have
been, it is said that it was at this meeting arranged that Seymour
should declare his adhesion to the Prince's cause at Exeter, which
he did, and was made governor of the city. At the time this
meeting is said to have taken place Sir Edward the elder was
dying, and he was buried by Prince on the 7th December, 1688.

In common with many of his brother clergy, Prince evidently
looked with sorrow on the changes which were taking place; and
in almost the only reference to William, which occurs in a de-
scription of Torbay, he is spoken of respectfully, but with none of
the enthusiasm Prince always evinced for the Stuarts. Still Prince
did not altogether admire James II.; and among his published
works are a series of sermons, entitled The best Refuge in the Worst
of Times, sermons which were preached at Berry Pomeroy on
Whit-Sunday and Trinity Sunday, when James II.'s declaration
for toleration was required to be published in parish churches.

It was the year following Monmouth's rebellion that the first
intimation on Prince's part appears of his intention to print for
the good of the country sketches of worthy Devonians, though it
is evident that he had been for some time collecting materials for
such a work. There is preserved among the papers of Mr.
Pine-Coffin, of Portledge, a letter written by Prince in 1686 to
Richard Coffin, of Portledge, in which he mentions the idea he
had had; but offers to resign it in Mr. Coffin's favour. The letter
appears in the appendix to the Fifth Report of the Historical
Manuscripts Commission, and is as follows:

"Hon' Sir,—According to my promise and your manifold obligations
on me, I have sent you Mr. Hooker's Chorography and History of the
Province of Devon, as he calls it. I should desire it may be carefully
preserved, and, as soon as conveniently you may, return'd. There are
many things of good note in it, which, with other collections I have made,
and further intended to have procured, I had sometimes the vanity to have
thoughts of printing for the good of our country. But I am glad, sir, that
the undertaking is like to be the province of one soe excellently qualefyed
both with learning, judgment, manuscripts, and estate as yourself, which
I hope you fully purpose and intend. . . . . It is all at present from him
who is, kind sir,

"Your most obliged and affectionate friend and servant,

"Berry Pomeroy, March 20th, 1686."

"John Prince."
In his account in the *Worthies* of Sir William Coffin, Knight, of Portledge, Prince has a reference to the person to whom he wrote this letter. It is as follows:

"The heir of this family was always called Richard, of which name is the present heir and possessor of this ancient seat Portledge, a right worthy and worshipful gentleman of great piety and virtue, and for his quality of excellent learning, especially in venerable antiquity, which hath been much his delight and study. He hath a noble library, and knows well how to make use of it. He was High-Sheriff of the county in the 2nd year of K. Jam. 2."

It is evident that Mr. Coffin, notwithstanding his "excellent learning" and "noble library," preferred to allow Prince to complete for the good of the country his noble work; and the worthy divine on receiving back Hooker's volume with such an assurance would settle himself down to his task. And no mean task it was, as a glance through the volume, which treats of no less than one hundred and ninety-four Devonian celebrities, and under their heads of many more of their descendants, will show what time it must have occupied. Information was not only gleaned from the works of other authors, but from inspection of family documents, and from correspondence with any one likely to give particulars which would add to the completeness of the work. Though there were, without doubt, many errors in the book when published, the work was not slurred over, but one which must have occupied a great portion of a lifetime, and one, notwithstanding mistakes and blunders, honestly and faithfully carried out by Prince. It was not simply a work compiled with scissors and paste, but one to which he brought all his energies. In many cases he brings in particulars from his own personal observation. For instance, to satisfy himself as to the birthplace of John Prideaux, D.D., Lord Bishop of Worcester, he purposely visited the house where he was born. He refers to having heard Sir William Morice, Knight, act as his own chaplain, though he kept a domestic chaplain. Speaking of Col. Bluett, who was killed at the siege of Lyme Regis, he says, "He was soon stripped, and his scarlet coat fell to the share of a common centinel whom I knew;" and again, speaking of Sir Thomas Bodley, the founder of the Bodleian Library, he says, "Sir Thomas Bodley was born in the city of Exeter, as appears from the history of his life, which I shall here offer to your view in his own excellent words, from a manuscript (on probable
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grounds) supposed to be in his own handwriting, now in the custody of a neighbouring gentleman (Walter Bogan, Esq., of Gatcombe, near Berry) nearly related to his family."

And some of his sketches are from life, as his reference to Dr. Bidgood, the Exeter physician, at his church at Berry, while attending Lady Portman, of whom he says, "I well remember when he was in attendance on a sick lady of an honourable family of this county, he was wont to join in the solemn church devotion there performed, with great seeming reverence and attention."

Referring to a hospital at Honiton for lepers, founded by Dr. Thos. Chard, he says that the account thereof was extracted from the original grants and papers; and the particulars respecting the Reynell family are from a manuscript lent him by a member of the family. A part of his account of Sir John Glanvill, one of the Justices of the Common Pleas, he says he received from an "intelligent person, Mr. G. D., of Tavestock, in a letter dated 29th July, 1695." This must have been when he was hard at work on his book, and gathering all the information he could to make it more complete. Of Ezekiel Hopkins, Lord Bishop of Derry, he writes that he knew personally, and in addition to what he knew of him was furnished with particulars by Dr. Tenison, Bishop of Clogher, who preached his funeral sermon.

Nor would he claim any great man as a Devonian, except on some good evidence; for, being doubtful whether Stephen Langton, Archbishop of Canterbury, could be honestly claimed as such, he applied to Richard Izacke, the Exeter historian, the author of the statement that Langton was born in Exeter, and gives in full the reply. It is dated February, 1693, and is as follows:

"Sir,—In answer to yours just now received, thus: In an ancient leger book, lodged in the council chamber of this city, I found that Stephen Langton, A.C., was a native hereof, which was the ground of my publishing hereof.

"In all things, I am, Sir,

"Your most humble servant,

"Ri. Izacke."

A model of a letter, short, and to the purpose.

I have, I hope, produced enough evidence to show that faithfully and carefully he gathered all the information in his power about those of whom he wrote. He says, in his conclusion, "Though others, I acknowledge, might have added more, yet I have faith-
fully collected, what was any way proper for my argument, out of all those authors which my slender library would afford; nay, and that of a very good one too, which my very kind and friendly neighbour, the reverend and learned Mr. Robert Burscough, vicar of Totnes, is furnished with all, the free use whereof he hath been pleas'd to indulge me.”

This Mr. Burscough had also a good collection of manuscripts, which are now preserved in the Harleian Collection, and he was himself an author, having written some theological works, one of which he published in 1701, the same year as the *Worthies* appeared.

Not merely did Prince collect carefully all he could of his heroes, but with equal care he quaintly wrote of them, interspersing his accounts with touches which show us his own views and opinions very clearly. I have already referred to his superstitious views, which crop up again and again, and to his stern denunciation of the sequestrators. Similar denunciations might be quoted of Cromwell, and the Parliamentary party generally, and extracts given showing his love for the Stuarts, and especially for the Royal Martyr. One I cannot omit, referring to a statement that Charles I., when Prince of Wales, had broken his word to one William Hakewill, by telling his father, James I., that which he had promised to keep secret. Prince says: “I am not willing to believe so good and just a Prince (as Charles I.) was ever guilty of so much perfidiousness; I am rather persuaded it came to the king's knowledge some other way;” and nowhere, perhaps, is his devotion to the house of Stuart so apparent as in his sketch of Sir Thomas Clifford, first Lord Clifford, the C. of “Cabal,” at the Restoration M.P. for Totnes, and in consequence his sketch, though not false, is to a great extent spoilt by the partiality shown.

How sad he is too when he writes of Church spoliation, and when he refers to his own troubles, though what they were is not very clear, unless we are to suppose that the Puritans of Totnes troubled him during his ministry there, or Edward Seymour while at Berry. He says, speaking of the charges against Bishop Bronescombe, “I am no way willing (having suffered so severely under 'em) to become the advocate of oppression or injustice in any, though a father.” And again, writing of Sir Simon Baskerville, Knight, a physician, he says, “There is moreover something remarkable recorded of him, that he was a great friend to the clergy (God knows, they have but few in this age).” Nor are there wanting
flashes of humour, as when he says of Browne, the Tavistock poet, "he got wealth, and purchased an estate (which in a poet is near as rare a sight as to see a black swan);" and again when he refers to one of his heroes as "once innodated with the bonds of matrimony," and another as "twice involved in a state of matrimony."

The work grew and grew, and what with digressions and genealogies, in which he evidently delighted, but was not always, I fear, quite correct, as he nears the end he is compelled to omit sketches he had prepared, because the volume was already swollen above the subscription price. Among those omitted was a memoir of Nicholas Monk, younger brother of George Duke of Albemarle, and who was created by King Charles II. Bishop of Hereford. Though his book was not illustrated with pictures, I must refer to a few of the beautiful little sketches he gives of scenes in Devon with which his heroes were connected, in addition to those already noticed. Quaint is the reference to Torbay and the village of Tormohun. "This is a small village lying in the eastmost part of Torbay; a bay, says Camden, of about twelve miles in compass. But of late years it is become much more famous than ever before, especially for that it yielded a landing-place in the most westerly creek thereof named Brixham Kay unto the Prince of Orange, our now gracious sovereign K. Wm. 3rd, on the 5th Novem., 1688. As also for being the station for several summers together of the Royal Navy and the Dutch fleet in confederacy with us in our late war with France."

Sharpham House, on the Dart, the birthplace of Edward Drew, Serjeant-at-Law and Recorder of London, he describes as "a pleasant seat, in the parish of Ashprington, about a mile and a half below the town of Totnes, in this county" (Prince's miles, I must observe, were long, it being nearer three miles, and I find this so in several cases). "It stands upon an ascent just over the river Dart, upon the west side thereof in its way to Dartmouth, where it disembogues itself into the ocean, about five miles from there to the south. It hath also a fine prospect of the river up to the town of Totnes, by which it is well near semi-insulated, whose daily flux and reflux affordeth in the season the choicest fish and fowl of various kinds both for recreation and hospitality, of which there was no want in the last possessor's time, Henry Blackaller, Esq., a J.P. of this county, an honest and friendly gentleman who lately inhabited there."
The description of Dartmouth in his day is very good: "Dartmouth, in the south part of this county, eight miles from Totnes, and twenty-six from the city of Exeter, is so called from the river on which it stands, which there runneth with full mouth into the British ocean. A large populous town, situate on the S. side of a very steep hill, which runneth from E. to W. a considerable length of near a mile, whereby the houses as you pass on the water seem pensil, and to hang along in rows like gallipots in an apothecary's shop; for so high and steep is it that you go from the lower to the higher part thereof by stairs, and from the bottom to the top requires no less, in some places more, than one hundred. It hath a most convenient harbour, able to receive a great navy into its bosom, which may ride safe without inconmoding one the other, load and unload in the midst of the town. The mouth of this river, near a mile distant from the town, is well guarded with two castles, and other munitions standing on the opposite banks thereof. Heretofore was also a chain which reached from one side to the other, which in time of war was wont to be set up to prevent any invasion of the enemy. This town then began to flourish when Totnes Haven, by overmuch sand brought down by the water from the tin-works in Dartmoor, was choaked up and spoil'd. Thro' the safety and convenient situation of its port this place became much frequented by merchants, and to be well furnished with good shipping, and is so still, tho' short of what it hath been heretofore."

Of Greenway, on the Dart, he says: "A pleasant and commodious seat, standing on the east side of the Dart upon a rising ground, a little mile above the town of Dartmouth. It hath a delightful prospect of that river, and views the boats and barges as they pass and repass upon it. A large scope of lands and the royalty of fishing and fowling are belonging to it."

Again, of Dartington Hall, then, as now, the seat of an Arthur Champernowne, he writes: "This is a pleasant and noble seat, standing aloft on the west side of the aforementioned river (the Dart), having a large and stately pile of buildings, much of the figure of a college in one of the Universities, with a fair quadrangle of about an acre of ground in the middle. The hall is very spacious, consisting of near 100 foot in length, with proportionable height and breadth, round which lieth one of the best bartons, both for number of acres and goodness of land, in this county, and is now the inheritance of Arthur Champernowne, Esq." The hall
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in question, now in ruins, is only 70 feet long by 40 wide, not 100, as Prince says.

These extracts will suffice to show that the Worthies, though it contained no prints or engravings of landscapes in the county, was not without word-pictures, which graphically describe the scenes with which the old Devonians were connected, and around which their memory lingered.

Prince's great work was printed at Exeter, by Samuel Farley, for Awnsham and John Churchill, at the Black Swan, in Paternoster Row, London, and Charles Yeo and Philip Bishop, fil (?), Exon. It first appeared in 1701, and, as I have before mentioned, was published by subscription, while, if we may judge from the eulogies of his brother clergy, it was indeed well received. There is, however, one peculiar circumstance with regard to these eulogies which I must notice, and that is, that they all appear in the 1701 edition, published by the author himself, and it would seem that he must have submitted the manuscript, or more probably the proof-sheets, to his brother clergy of the neighbourhood for perusal. It may be deemed from his appending these favourable comments that he was a proud and conceited man; but may we not excuse his pride and conceit, as we remember that authors in the nineteenth century, or some at least, are not exempt from these failings.

I have been furnished by a friend with a copy of a letter from Prince to Sir Philip Sydenham, of Brimpton, now among the Egerton Manuscripts in the British Museum, having been purchased of Mrs. Sydenham as late as October 8th, 1867. It is of great length, and mainly a lengthy dissertation on the genealogies of the Sydenham family; but in it are several touches which will be of interest to all who care about the old Devon antiquary, and much of it will, I think, be quite new to most of you. The letter is dated Berry, August 5th, 1712, and commences as follows:

"Most Hon. Sir,—I have your last, and do profess it exceedingly pleases me to find a person of your quality to be not only a lover of learning, but also so very learned, especially in that kind of learning so well becoming the study of a gentleman, I mean Antiquarianism. We had in this county the last century a happy constellation of worthy gentra who mightily delighted in this sort of study, as Hooker, alias Vowel, Sir Wm Pole (ancestor to ye present Sir Wm Pole, of Shute, Bartt.), Risden, Westcott, Holland, Sir John Northcott, Bartr, &c.; but now I
find not one whose genius inclines him that way. The very best among them all, I am certain, is Sir Wm Pole, whose MSS. do as far excel Leland's, if those fragments of his you are pleas'd to honor me with be all he wrote of Pollard, Pomeroy, and others; as ye moon ye lesser stars."

Then he proceeds to his dissertation on the Sydenham family, and towards the close of the letter is a reference to some one (the paper is torn, so that the name cannot be deciphered) who aroused the worthy man's ire, and whose orthodoxy was doubtful, because he had made translations "for the assistance of that bare-fac'd heretick Whiston."

Then comes a reference to a second part of the Worthies, and one most valuable, because I am unaware of any English notice of Prince which contains any reference to such a work; and it is one which cannot but lead us to wonder what became of this second part, which no doubt contained worthy Devonians for whom there was no room in the first. It is possible it may still be in existence, hidden away somewhere, its value unknown, or it may be that long ere this it has found its way to the butter-shop.*

Prince says then towards the close of the letter to Sir Philip Sydenham:

"As to printing of my book, I shall use what endeavours I can. I highly approve of yr advice of printing it at London. I am sure I am some scores of pounds ye worse for my not printing my 1st volume there. And I fear because the London booksellers had not the printing ye 1st part, they will hardly undertake ye printing of ye second. I shall be glad to meet with good encouragement herein, wth I don't despair of with good management."

In concluding he says, "I have not had an opportunity of going to Totnes (tho' I don't live much above a mile from) since I rec'd yr last; but the next week I shall have some occasion to be there, viz., our Bishop's visitation, wth I shal (God willing) make an enquiry of Mrs. Burscough, and send you an account thereof in my next. In the meantime I beg yr pardon for any indecency of expression; as being desirous of approving myselfe whereinsoever I am able."

I am unable to ascertain why the second part of the

* Since this paper was read I am informed that the manuscript of the second part of the Worthies is in the library of the late Sir Thomas Phillipps, at Middle Hill, Cheltenham, but is not accessible.
Worthies was not printed; eleven years elapsed between the date of the above letter and Prince's death. It may be that age and infirmities prevented his doing so.

In a French work (Biographie Universelle, Supplement, 1846), is a notice of Prince, and a reference to a second part of the Worthies. The writer says the first part was so coldly received that the author did not publish the second volume, though it was prepared for the press, and states that this indifference to the value of Prince's work is referred to in D'Israeli's Calamities of Authors; but I have not been able to find the passage. The same work mentions that Prince was a member of the Society of Antiquaries.

In addition to the Worthies, and the sermons I have already noticed, he published Seasonable Advice to Sober Christians, a sermon preached at Totnes, 11th September, 1687, when he was vicar of Berry, and just three months before Sir Edward Seymour was dismissed from the recordership; also A Defence of the Exeter Bill for Uniting the Parishes, and Settling a Maintenance upon their Ministers; and A Letter to a Young Divine, containing some brief Directions for Composing and Delivering Sermons. He also compiled the nineteenth chapter of Westcott's View of Devonshire, containing the list of the Bishops of Exeter from that author's time to October 20th, 1695.

More than a century elapsed before a new edition of the Worthies was issued; but in 1810 it reappeared, edited by the publisher, Mr. Rees, of Plymouth, who received material assistance from Dr. Woolcombe and Henry Woolcombe, Esq.; while the late Lord Grenville contributed the materials for the notes on that family. It had numerous notes of correction, explanation, and continuation, and was dedicated to Hugh, Earl Fortescue, Lord Lieutenant of Devon, whose ancestors claim a distinguished place in the work. In their preface the editors say, "More than a century has elapsed since the publication of the work, of which a new edition is now presented to the public. The estimation in which it has always been held, and the high price at which it has for some time past been sold, led the editors to presume that its republication would not be unacceptable; and the liberal patronage afforded to their proposals has fully evinced the justness of the presumption." This edition was also published by subscription.

The Registers at Berry during Prince's time are exceedingly
well kept, and in one of them I find the following well-known lines:

“Oh, now we have lost four wheels of Charles's wain!
Godolphin, Grevill, Travennion, Slanning, slaine
With other stars belonginge to the same,
Whose matchless valler the world could deign.”

The Berry Registers contain in the case of burials a note that the affidavit that the body had been buried in woollen had been duly produced. This was in accordance with Acts of Parliament passed to lessen the importation of linen, and for the encouragement of the woollen and paper manufactures of the Kingdom, and which endeavoured to attain that object by inflicting a fine of £5 in the case of bodies buried in linen. The affidavit was required to be made within eight days and brought to the minister. At Berry in one case only was the £5 paid, that of Lady Ann Seymour, widow of Sir Edward Seymour, who died in 1688, and was himself buried in woollen. The entry of her ladyship's burial is as follows: “1694, February the 11th. Then was buried the Honourable Lady Ann Seymour, of this parish, by Mr. John Prince, vicar. And paid for the burying in lening five pound according to the Act.”

In a chest in the vestry while examining the Registers I found an old book containing the churchwardens' accounts for 1713–14 and following years; the entries in which show that the practice of rewarding destoryers of animals, classed by the rural mind as vermin, out of the church funds, was in vogue here while Prince was vicar; and from the extracts which follow it will be seen that the prices were higher than in some other parishes.

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"1713-14.  s.  d.
Pd. Mr. Lyd’s son for killing 16 Hoops (Bull-fitches) . 1 4
Pd. Roger Ford, Junier, for killing 2 Badgers . 2 0
Pd. Mr. Lyde for killing 30 Hoops . 2 6
Pd. Mr. Horsham’s boy for killing 7 Hidge Hoggs . 2 4
More for 3 Jayes . . 0 6
More for 9 Hoops and 10 Heckmales (Tom Tits) . 0 10
Pd. George Penny’s boy for killing 10 Heckmales . 0 5"
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In 1717 there are many similar entries of payments for killing badgers, hoops, jays, fitches, greys (badgers), &c., and the following:

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“Gave ye hunter when he killed ye Fox . . 2 0
Pd. for meat ye 2nd day of Hunting ye Fox . 2 6
Pd. Stockman for killing two Foxes . . 8 0"
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"
And now my task is drawing to a close. John Prince lived to a good old age, holding the vicarage of Berry Pomeroy for no less than forty-two years, and reaching fourscore years. On the 9th of September, 1723, he passed away. His illness does not appear to have been a very long one; for on the 16th of June, 1723, he conducted a funeral service, and on the 14th of the following September was himself buried, only three months after.

The only monument now to be found in Berry Church to his memory was not erected until after the death of his successor, Mr. Fox, and he held the living for fifty-eight years, so that together he and Prince were vicars of the parish for a century. This monument is a plain marble tablet, in the wall on the north side of the chancel. The inscription is as follows:

In Memory of

THE REV. JOHN PRINCE, A.M.,
VICAR OF THIS PARISH,
AND AUTHOR OF "THE WORTHIES OF DEVON."
HE WAS INSTITUTED IN THE YEAR
1681,
AND DIED ON THE 9TH DAY OF SEPTEMBER,
1723.

ALSO OF

THE REV. JOSEPH FOX, A.M.,
SUCCESSOR TO THE ABOVE.
HE DIED ON THE 1ST DAY OF FEBRUARY,
1781,
AGED 88.

Prince was married, but I am unable to discover who his wife was. She did not long outlive him, the following entry appearing in the registers just five months after Prince's death:

4th February, 1724.

Then was buried Mrs. Gertrude Prince, Widow of Mr. John Prince, Vicr. by Mr. Joseph Fox, Vicr.

February 9th.

Then received the affidavit for the said Mrs. Gertrude Prince.”

The register of St. Martin's, Exeter, contains among the baptisms an entry of the baptism, on the 20th of February, 1669, of Nicholas Prince, son of John Prince. This was just after Prince's settlement in Exeter. I cannot find that there was any other child, nor that the son here referred to survived his parents.

John Prince appears to have been a popular preacher and a very
zealous defender of the principles of the Church of England, an honest and painstaking author and antiquary, to those who lived around him a pit of learning very deep. One cannot help being attracted by the simplicity and kindliness of heart, the good sense, and the strong local patriotism, that are displayed in nearly every life he recounts; and I cannot but feel how imperfect is the sketch I have ventured to place before you of this worthy man, whose works being considered only local must be the reason that he is unnoticed by any of our English biographies.

Mr. King, in his sketch of Devonshire in the Quarterly Review for April, 1859, reprinted in his Sketches and Studies, says: "It is scarcely possible to imagine a more delightful volume than might be made of Prince's 'Worthies,' with the additions to be gained by modern research, and with illustrations from good portraits, personal relics, ancient manor-houses, and sepulchral monuments;" and this I would heartily endorse, and express the hope that ere long some competent person may undertake the task—some man who, like Prince, is to public good inclined. Should such a one be found, he will, I am sure, give old John Prince a foremost place, and so fulfil the wish of his friend John Legassick, rector of the neighbouring parish of Littlehempston, who, writing of the Worthies, said:

"Ages to come, when this your work they see,
And therein read your care and industry,
Will doubtless in requital something do,
Which may repay the kindness done by you.
But vain these hopes, unless they also find
Men like yourself to public good inclin'd,
Who, being led to imitate your pen,
May the same way oblige the world again—
Recount the doings of the sons of fame,
And 'mongst the foremost place your worthy name."

If there be one feeling more than another which should strike a Devonian as he reads of the "Worthies" of his county in past ages, it should be, I think, a feeling of pride that he is a Devonian, and that not only can his county boast of heroes and worthies in the past, but can to-day point to a Coleridge on the bench and a Stafford Northcote Chancellor of the Exchequer and Leader of the House of Commons—enough to show that Devon's sons still hold their own. You will all, I hope, join in Prince's own hearty prayer, "that God would be pleased daily to increase the number of Devon's 'Worthies,' and raise up some one to celebrate their memories worth their praise and just renown."
THE NEWSPAPER PRESS—AT HOME.

SYLLABUS OF MR. J. T. FOURACRE'S PAPER.

(Read February 7th, 1878.)

The lecturer treated of different styles of house-building; old buildings; fashion in house-building; architect and client; building-stones; plaster and plastering; fronts of houses, and front doors; interiors; warming; ventilation; furniture and decoration.

THE NEWSPAPER PRESS—AT HOME.

SYLLABUS OF MR. HAMILTON WHITEFORD'S PAPER.

(Read February 14th, 1878.)

The newspaper press—at home. The press abroad reserved for a future lecture (as the subject is too wide to confine in one paper), and therefore only slightly referred to now.

THE ULTIMATE LIMITS OF FOOD PRODUCTION.

ABSTRACT OF MR. ROBERT SMITH'S PAPER.

(Read February 28th, 1878.)

For the production of food certain materials are requisite. Although some of these materials, such as water, iron, &c., are so abundant that we need scarcely consider them as effectually limiting the production, others are strictly limited; such are the phosphates and nitrogenized compounds. After touching on the manufacture of nitrogen compounds from the atmosphere, the lecturer pointed out that the economy of exhausted food constituents is highly desirable. Other conditions are necessary besides an unlimited supply of ponderable materials; viz., a proportionate supply of force or energy. Source of this supply in vegetables. Remarks on the land question, and speculations as to its future, concluded the lecture.

THE SPIRIT OF MODERN ENQUIRY.

ABSTRACT OF MR. W. HARVEY'S PAPER.

(Read March 7th, 1878.)

The importance of clear ideas of investigating nature was strongly insisted on. The exactness and thoroughness of physics may now be applied to mental and moral science. The causes of mediæval failure may be instructive even now. The middle ages were stationary in science, because they bowed to authority, and failed in experiment. The metaphysicians failed to establish philosophy on a firm basis. Mental philosophy must be based upon observation, internal and external. Phrenology, an empirical science, was traced in its effect in mental science. Experiment and observation in physics is now the recognized method. The same principles apply equally to history, to sociology, and to all enquiry.
THE RELATION OF ART TO MORALITY.

BY MR. W. ADAMS.

(Read March 14th, 1878.)

LIGHTING AND HEATING AGENTS.

ABSTRACT OF PAPER BY DR. OXLAND, F.C.S.

(Read March 21st, 1878.)

Dr. Oxland noticed the old lights of fifty years since, sketched the history of improvements in lighting materials, such as candles, vegetable, animal, and petroleum fluids, and likewise that of coal gas manufacture, adducing evidence of its very great importance, not merely in respect of lighting purposes, but also in reference to the great value of the by-products obtained from coal tar, &c. The future of gas-making was then considered in relation to the threatened interference of the rapid improvements being introduced in lighting with electricity; and proof given of the value of gas as a heating agent for all domestic and some manufacturing purposes, as a substitute for and a great economiser of coal. In conclusion, Dr. Oxland observed: We have more light, but we want more still, both physical and mental. The little we have already obtained has converted the first hindrances of the primary gasmakers into desirable aids. To understand this we will just take the report of a single gas company; we will analyze it, and see what will come out of it. I refer to the report of the Birmingham Corporation Gas Works for 1877. The total amount of capital engaged is 2 1/4 millions, serving 500 miles of mains with 2664 million cubic feet. The quality of the gas is 17-27 candles, equal to 21 candles better than parliamentary standard. Total value of products £453,727, of which £128,148 is nett revenue or profit, equal to 5-69 per cent. In the course of the year we find, coals carbonized, 289,253...
tons; gas produced, 2664 million feet, which sold at from 2s. 9d. to 4s. 3d. per thousand—average about 3s.; coke and breeze, £55,868; tar, £33,205; ammoniacal liquor, £16,584; sundries, £181. This company belongs to the town, and in two years earned £55,000, devoted to the reduction of local taxation.

But these results are greatly exceeded in the experience of the Manchester Corporation, which has of late years been the means of keeping to the front the very important question whether it is not the duty of every municipal corporation to take into its hands the supplies of water and of gas. In 1807, at Manchester, there was one gaslight, which was over the police office. In 1817 the Police Commissioners erected gas works, and supplied gas at 14s. per thousand, and from time to time extensive additions have been made under the administration of the town authorities. With such success have these operations gone on, that the Gas Committee of the Corporation, up to 1876, have transferred the sum of £1,060,075 to the Improvement Committee, which sum therefore, instead of passing into the pockets of private shareholders, has been devoted to the commercial interests of the whole population. Why should not we do likewise here at Plymouth? We have already sufficient evidence of administrative ability on the part of our municipal authorities in the present state of the water supply, although outsiders seem to think there may be considerable improvement.

Such a project would doubtless meet with opposition from the shareholders; but their proper interests may be equitably adjusted consistently with the taking in hand by the Corporation of the supply of gas, so that the benefit of the future enlargement of the town may be as equitably divided amongst those who may contribute to its future welfare. It is true that there are many pros and cons to be advanced. For example, the town authorities would have carefully to consider the possibility of gaslighting being superseded by electricity. Certainly this would greatly diminish the value of the old plant, but there would then be brought into prominence another view of the value of gas-works to which but little attention has as yet been directed by present gas companies.

If electricity be introduced, power will be required to develop it. This power can only be developed by supplies of water or of fuel. If water be used, let an equivalent charge be made for its con-
sumption; and let the gas-works be devoted to the supply of gaseous fuel, which may be rendered, by a modification of the present gas-making apparatus, at less cost than for all domestic purposes at least equal effects can be obtained by the burning of coal.

The present company, although supplying gas, through the admirable management of its engineer, at lower cost than any other gas-works in the kingdom, is so well satisfied with the dividends obtained that it does not offer any inducement for the extension of the use of gas as fuel. At the present moment a very large proportion of its plant is idle more than half the time.

By the supply of gas for heating purposes at a sufficiently low price to supersede the use of coal for all domestic purposes of lighting, heating, and cooking, and for some manufacturing purposes, the demand for gas would soon increase so considerably that large additional capital would be required, which there would be no difficulty in obtaining, under the auspices of equally good management as the present, under the superintendence of the municipal authorities.

Let us suppose a case, in order to see the bearings. Suppose the present gas company merged into the municipal corporation, and energetic efforts made to promote the use of gas by reducing the price, offering to rent gas furniture, as well as meters, especially cooking arrangements, resulting in the acceptance by the public of the proffered boon. Three times the consumption of gas would involve but a limited increase of plant, and the same distributing service, without increase, would be sufficient. More making plant, retorts, &c., would be required, and therefore more capital, which could readily be obtained at small interest. The company should work up its own residual products, and convert all its gas liquor into sulphate of ammonia, for which there is an unlimited demand. It should also convert all its residuary product in the shape of coal tar, into the best saleable matters, obtaining pitch, anthracene, naphthaline, heavy oils, benzoles, and coke. By so doing it would prevent a glut of the outside coke market, and the reduction of price, by usefully consuming its own coke. Supposing eventually the consumption of coal in private houses entirely superseded, the smoky atmosphere of the town would be cleansed, and its sanitary condition in this respect promoted. All the ammonia of the coal now burnt in private houses would be utilised.
One of the troubles of modern life would be modified, for by the abolition of the present fireplace, and avoidance of consequent dirt, one servant will be able to do where two are now required, or certainly two where three are necessary. The town having an interest in the success of the gas-works, instead of sending to Caithness, in Scotland, for flags to pave its streets, would use up pitch and tar freely for making even better roads than the stone now used.

The free use of artificial asphalte for building purposes would greatly improve the sanitary condition of the town; and we might fairly hope, by beautifying our much-loved old Plymouth, to make it a pattern town.

We want means of profitably investing and utilizing capital. Here we have it; and we only want a small share of the faith and energy so splendidly displayed in the histories of the pioneers of the gas, paraffine, and petroleum interests, of a Murdoch and of a Young, to ensure the successful issue that I have endeavoured to suggest.
THE TRADE OF PLYMOUTH.

BY MR. W. F. COLLIER.

(Read March 28th, 1878.)

The Trade and Industries of Plymouth are as much the effects and results of natural forces and laws, as the tides, the rivers, and the geographical and geological conformations which are the principal features of this fine and beautiful harbour. In fact the same forces which have so formed the coast as to give us this grand port, physical forces as every one will pronounce them to be, may also be said to have caused the trade and the industries which man has followed within its precincts under the influence of moral or mental forces.

I have placed the trade and industries of Plymouth in the order named in relation to one another because I regard Plymouth as a trading port, and not an industrial or producing centre. The industries and the trade are of course the principal features in the economy of a nation, and are subject to economical laws; though it may be well to remark in passing that economical laws, whether they may be deemed to have been discovered or not, many of those propounded being questioned and disputed, are never operative by themselves, but are always operative in conjunction with other social laws, which modify, alter, pervert, and sometimes entirely negative them. Still, they exist, and exert an influence of their own in all our social actions and feelings, however heroic may be our aspirations, however dismal we may call the science that arises from the investigation of those social forces, which result in one man living on fifteen shillings a week and another spending fifteen thousand pounds a year, each of them imagining that a little more would make him contented.

The productive power of a nation may be divided into two great classes—the industries (applying the term to productive industry), and the trade. They are very different operations, though without
trade there could be no industries in their present modern form, and without industries there could be no trade. Trade as at present carried on is an extremely complicated system of interchanging the productions of industry, and may be said to be the key that unlocks the industries of the people. No one could devote himself to that particular branch of industry for which his own capabilities or his surroundings best qualify him, unless he could exchange the produce of his industry for any other produce of industry that he may require through the trader; and the extent to which the division of labour is now carried, with the consequent enormous increase of production, has been made possible only by the facilities for exchange offered by the ingenuity and organization of trade.

The trade and industries of a nation being therefore interdependent, and so closely related to one another that the importance of the one cannot be considered as greater than that of the other, it is no disparagement to Plymouth to rank her as a trading port rather than a centre of industry. It is evident that trade, which is the process by which exchanges are effected between man and man, can only be conducted where facilities of communication enable those exchanges to be made, and if this be a trading port, it must be so because it offers certain facilities of communication.

In the economy of this great nation, which has carried the study of economy, both theoretical and practical, further than any other, a particular locality may be said to perform its own particular function in the economical body corporate, and, following the analogy of biology, the function will correspond with the structure. The structure of the locality in which coal and iron abound causes those economical functions to be performed that are peculiar to the great centres of industry; the structure of good and safe ports is equally the cause of the economical function of trade carried on within them.

Regarding the economy of this nation as a great, a gigantic organization, which it undoubtedly is, each part performing its function according to its capabilities, or, as I prefer to say, according to its structure, it is well to inquire, What is the true function of Plymouth in the economy of the nation? and what is the structure that fits it for that special function? If in the fulness of our energy and strength we seek, as Plymouhrians, to perform a function unsuited to our structure, we shall not succeed, and we waste our gifts, whether of mind or matter, whether of talent or
capital, in a vain endeavour to defy nature. But if we study the
structure of our surroundings, and the functions which they enable
us best to perform, we are successful; and in proportion to our
success is our utility to the nation, and, in a still wider sphere, to
the world at large.

The structure of this island-home of ours has enabled us to
perform a great function in the history of the world; not the least
important part of which has been the trade that we have carried
on with all the nations of the earth, enabling industry, wheresoever
it may be, to interchange its produce for whatsoever industry pro-
duces. Active as we have been in the practice of trade, we have
not been less so in our enquiries into the principles or the funda-
mental laws, on which a successful trade ought to be based; and
it is to be hoped in this last respect also, on principle as well as in
practice, we have taught a lesson and set an example of the utmost
utility to the world at large.

I have already said that trade can only be carried on where
facilities of communication exist. These facilities are offered at
Plymouth by its position with respect to the rest of the world as
part of the structure of these islands, and by its own peculiar
structure as one of the best harbours for shipping on the face of
the earth. The facilities of communication between Plymouth
and the rest of the world by sea are beyond all question great.
The facilities of communication between Plymouth and the rest of
the world by land are, and have for some time been, too much the
reverse.

Plymouth is essentially a harbour for shipping, and has performed
that function in the economy of the nation from pre-historic times
until now. It was used as a harbour when the Phœnicians traded
with Devon and Cornwall for tin. It was used as a harbour
when the sea-kings of Scandinavia descended upon our coasts and
devastated the rich pasture lands of Devon. It has been a harbour
in all our relations with the French on the opposite coast, whether
in peace or in war. It was Drake's own peculiar harbour, from
whence his enterprizes on the ocean were launched, and from
whence, whether as a rover, an explorer, or the Queen's admiral,
he led the sailors of the West of England into the most daring
exploits of seamanship ever performed. It was a harbour when
the Pilgrim Fathers sailed from England to found the mighty
nation of the American States. It has been a harbour for our
fleets in all the wars in which we have engaged. Nelson's ships sailed from here to sweep the combined fleets of Napoleon from off the surface of the ocean. And Napoleon himself, as a prisoner of war in the Bellerophon, at anchor in the Sound, his portrait when standing in the gangway of the ship having been painted by Eastlake, one of us, sailed from here never more to disturb the peace of Europe. It has been, and is, the harbour from which the English people emigrate, to carry their industry and their energy to our distant colonies.

It will be seen that although Plymouth ranks high as a port for commerce, her principal trade is an import and not an export trade, reckoned as imports and exports are, by their weight or measure, by their value in money, or by the Customs' duties that are paid. But if we were to reckon our own flesh and blood as exports, which however cannot be reckoned by such standards as these, the rank of our exports would be of the highest. In short, as this has ever been a harbour for sailors, it is now, when so many people who are not sailors cross the oceans, a harbour for passengers.

The highway for us as a nation to the whole of the world is southward, with the single exception of the northern parts of North America; and to go south Plymouth is the best and the last harbour from which to embark on the expeditions so congenial to the genius of the nation; the best and the first harbour at which to land when homeward bound.

Look at the map of the world, and the situation of Plymouth. The structure of the continents and the oceans show plainly that the function of Plymouth is to harbour the shipping, to embark their living freight on leaving, or to land them on returning home, thus sparing them the danger, the inconvenience, and the loss of time of the Channel passage. It is practically the furthermost harbour to the south-west on the path to and from the rest of the world; and for every reason, whether economical or otherwise, the furthest port on embarking, and the nearest on landing, is the best. Even the sailor, fond as he may be of the sea and his roving life, lingers on shore when the blue-peter is flying at the mast-head until the very last moment. Byron says:

"My boat is on the shore,
My barque is on the sea,
But before I leave, Tom Moore,
Here's a double health to thee."
Plymouth has no rivals. The history of the harbour alone is a proof that successive generations of seamen, with the ships of the past as well as the ships of the present, have found none.

The merits of the Harbour consist—1st, of its accessibility; 2nd, of its safety, including good anchorage; 3rd, of its depth of water in favourable situations, where ships are either at anchor or discharging and shipping cargo alongside of wharves.

The accessibility of the Harbour is easily demonstrated by reference to the chart of the Channel looking at it from the sea; with the Eddystone Lighthouse far out in the track of the ships sailing up or down, as a beacon indicating the entrance of the harbour; the Rame Head and the Mew Stone, prominent headlands, enclosing it; within which the heights of Penlee and Mount Edgecumbe to the westward, and Bovisand and Staddon Heights to the eastward, with Drake's Island, the Hoe, the Citadel, and Mount Batten in the background, and the Breakwater stretching its artificial protection across the foreground, form a picture of beauty intensified to sublimity by the sentiment which it inspires of refuge and protection from the perils of a storm. Plymouth harbour is beautiful in a calm sea and a cloudless sky,

"When the stately ships go on
To their haven under the hill;"

it is sublime in a hurricane.

The safety of the harbour consists in the good anchorage which it affords, not only in one particular spot, but in nearly all parts of the harbour.* Good anchorage implies good holding ground for the anchor, depth of water sufficient for ships of any size, and protection from heavy seas and gales of wind. These are to be found in many parts of the harbour (the depth in feet is always reckoned at low-water, ordinary spring tides), viz.:

In Cawsand Bay, which was much used before the Breakwater was built, where there is anchorage in 30 to 42 feet of water, on sand, mud, and shells.

In the Sound, where the best anchorage is in 30 to 36 feet of water, on soft mud, the anchorage for the royal navy and the merchant ships being separate.

In the Hamoaze, where there is an unrivalled anchorage in great depth of water, ranging from 18 to 108 feet, on mud and shingle, reserved by Government almost entirely for the use of H.M. fleet.

* See chart of harbour, p. 275.
In Stonehouse Pool, where there is anchorage of 24 to 36 feet, on mud, for a small number of ships.

In Barnpool, where there is 78 feet of water, on a hard bottom, with moorings close under Mount Edgecumbe; a lovely situation, used chiefly for yachts, and occasionally for H.M. ships.

In the channel between Drake's Island and the mainland, where there is very good anchorage in 36 to 108 feet of water, on mud, used largely by yachts, some of which are of considerable size, by the beautiful little training-brigs of H.M. service, and by some merchant ships on their way in or out of other parts of the harbour.

In Cattewater, a very ancient anchorage within the harbour, where ships can lie at anchor with the greatest safety in 13 to 48 feet of water, on mud. Off Turnchapel there is 30 to 48 feet of water, which is at present but little utilized considering its value.

The favourable situations for ships to lie alongside the land to deliver their cargoes are very numerous, and it would be but tedious to mention them all, as they are well known. The best parts of the harbour for this purpose are—

The eastern shores of Hamoaze, occupied by the Government for the Dockyard, and therefore not available for other purposes.

The Tamar, a navigable river as far as the Weir Head, about twenty miles, with many wharves for loading and discharging cargoes along its banks, and the banks of the navigable portion of its tributaries, all forming a part of the trade of the harbour of Plymouth.

The Great Western Docks, where there are very good floating-docks for the discharge and shipment of cargoes, in eighteen to twenty-two feet of water, the trade carried on within them being very large, and increasing yearly as the trade of the harbour increases. The Great Western Dock Company, which is in effect the Great Western Railway Company, is in possession of the whole of Mill-bay; and outside the docks it has the pier, the pontoon, and the jetty, alongside of which ships can lie in eighteen to twenty-four feet of water, the pier and the pontoon being used by the many steamers that regularly trade here. The area of the docks is thirteen acres, and of the outer harbour thirty-five acres. The Great Western Railway Company will probably make very considerable improvements in their harbour for the accommodation of shipping, especially for steamers of large size.
Cattewater, a very important part of the harbour of Plymouth, which in the future will probably be very greatly developed by the Cattewater Commissioners. There are wharves on its banks where cargoes are discharged; but its principal value at present is the good and safe anchorage that it affords, and the moorings in deep water for large vessels that it contains.

Sutton harbour, which is inside Cattewater, in the heart of the old town of Plymouth, and the still older town of Sutton. This is no doubt a very ancient harbour indeed. It is situated near the mouth of the Plym; and before the Great Western Docks were made, nearly the whole of the trade of the port was carried on within it. Here are the Custom House and the bonded warehouses, which bound trade hand and foot in the old days of complicated restrictions on commerce, when nearly everything was subject to duties levied in a great variety of ways, when nothing could be done except in the presence of an officer, and when the documents to be signed and countersigned in a sort of mystic fashion were innumerable.

Sutton harbour within the old eastern and western piers has an area of twenty-nine and a half acres, and a depth of water at ordinary spring tides of nineteen and a half feet. It is at present a tidal harbour, and this circumstance has prevented the trade within it from increasing in proportion to the increase of the general trade of the port. The Sutton Harbour Company have powers under Acts of Parliament to make a dock, with tramways in communication with the railways; and the design they contemplate is to make a floating-dock of twelve and a half acres, with a depth of water of eighteen to nineteen feet.
I have now described the port of Plymouth, I hope sufficiently for the purpose of considering the trade that is carried on within it; but in order that the character of the harbour in its relation to shipping may be more fully understood, I give the draught of water of the various sorts of ships now afloat. The draught of water of ships is always given in feet; the depth of the water is always given in fathoms, a curious incongruity which pervades the calculations of the English nation. We must have different weights and measures for everything that differs—nautical miles and imperial miles; pounds avoirdupois and pounds troy, &c. I have ventured to turn the fathoms into feet, that the draught of the ship may be more easily compared with the depth of the water in which she is required to float.

### Draught of Water of Ships

<table>
<thead>
<tr>
<th>Ship Type</th>
<th>Greatest Draught (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Great Eastern, the largest</td>
<td>35</td>
</tr>
<tr>
<td>H.M.S. Nelson and Northampton</td>
<td>25</td>
</tr>
<tr>
<td>Orion</td>
<td>23</td>
</tr>
<tr>
<td>Belleisle</td>
<td>19</td>
</tr>
<tr>
<td>Australian steamers</td>
<td>22 to 25</td>
</tr>
<tr>
<td>French mail steamers</td>
<td>22 to 24</td>
</tr>
<tr>
<td>Royal mail steamers</td>
<td>19 to 24</td>
</tr>
<tr>
<td>Hamburg American steamers</td>
<td>20 to 21</td>
</tr>
<tr>
<td>North German Lloyd steamers</td>
<td>19 to 22</td>
</tr>
<tr>
<td>Cape mail (Union) steamers</td>
<td>18 to 20</td>
</tr>
<tr>
<td>Emigrant ships</td>
<td>18 to 20</td>
</tr>
<tr>
<td>Ordinary traders</td>
<td>8 to 19</td>
</tr>
</tbody>
</table>

I have said that the facilities of communication between Plymouth and the rest of the world by sea are beyond all question great, and that the facilities of communication between Plymouth and the rest of the world by land are much the reverse.

It was late in the day of the railway system before a railway was extended to Plymouth; and when a railway was at last projected, the importance of Plymouth as a harbour, with a population much larger than any city or town south of London and Bristol, was completely overlooked, and instead of carrying their line straight to the largest population, the railway company went coquetting round the coast with every little township they could find.

The difficulties of the approach to Plymouth were naturally great. It so happens that the access from Plymouth to the rest of
the world by land is from west to east, whilst the rivers which have hollowed out the deep valleys, and have indeed formed our harbour, depositing the mud for our best anchorage in the process, run from the hills north to south. Railways therefore cannot run along the valleys to us, but must be taken across them. They cannot be constructed so that the course of a valley would offer facilities to a line, but they must be conducted across numerous valleys which form obstructions. We must content ourselves with the reflection that the same natural forces which have formed for us our harbour, and given us access seaward, have also formed obstacles to our access landward. The two railway companies which have at last carried their competing lines to Plymouth, in a timid, hesitating, roundabout sort of fashion, looking, it would seem, anywhere for their traffic except where only it is to be found—that is, where the harbour, the population, and the enterprise are—have attempted to go round the hilly districts without succeeding in avoiding the hills, and our trade is thus limited to their limited capacity for carrying it.

The trade of Plymouth and its industries would no doubt have been enormously developed beyond their present condition, if railway communication had been supplied at all adequate to the requirements of the port when it was supplied to other districts more favoured by railway companies. In some cases the advent of a railway has been the cause of unexpected prosperity. In the case of Plymouth, the natural advantages of the port have compelled, as if reluctantly, a laggard railway communication to be slowly projected by two great companies, who seem to have been competing with one another how best to avoid the obligation of carrying the traffic of a magnificent harbour, with a population of 150,000. To view the splendid harbour from the Hoe, and to walk from there to the railway station, is a descent indeed from pride to humiliation.

Such is the condition, as I have described it, of the communications between Plymouth and the outer world, by sea and by land, on which its trade and its industries depend.

The trade of Plymouth to be well understood, like everything else, must be analysed and examined in detail; and I hope the process will not prove a very tedious one. The trade of Plymouth therefore for this purpose may be divided into,

1st. Import trade.
2nd. Export trade. Terms which always imply trade with countries outside Great Britain and Ireland.

3rd. Coasting trade; which implies trade by sea within Great Britain and Ireland.

4th. Inland trade; a term which speaks for itself.

5th. Internal or town trade; which consists of our dealings with one another inside what we may consider to be our own boundaries.

6th. Shipping trade.

The import trade of Plymouth may be ranked as the principal trade of the port, and is the natural consequence of the facilities of access to the rest of the world offered by the harbour. It is a very antient trade here indeed, and has varied in its character with the ever-varying circumstances which have succeeded one another from age to age. As we have now only to consider the state of the trade as we find it, I will limit the period to which it will be necessary to call the attention of the Institution to the last twenty years, more or less.

I shall be obliged to throw some figures at the heads of my hearers. This is in itself a figure of speech, but it is a very apt one. It is as well to throw stones at one's head as figures, for the one does not create more confusion than the other if due care is not taken with the figures that they may convey some idea beyond themselves. So many thousands, or so many millions, have no value in themselves, and only tend to confusion unless a significance is given them by comparison, by making them relatively high or relatively low. It has been said that nothing is so misleading as facts except figures, and I believe that saying is strictly true, unless the facts and the figures are used with due consideration for that quality which is known as the relativity of the human understanding. I do not expect however to find a scientific institution, as this is, impatient of figures that are necessary to the subject before them.

I have mentioned the Custom House and its officers in an earlier part of this paper, referring to an earlier state of the trade of Plymouth, in unfavourable terms. I have here to make amends by saying that as the Custom House and its officers now perform their functions, they are of the greatest possible value to commerce by supplying most important statistics, arranged and classified in a
very convenient form, for the information and guidance of those whose business it is to study the markets of the world. The Custom House officers of the present day show a zeal to promote trade, as far as it is possible in the exercise of their office of collecting and protecting the revenue, which deserves high commendation at the hands of every merchant, and is a conspicuous instance of the, I believe, unequalled merit of the civil service of this country. If at any future time trade could be altogether freed from fiscal duties levied on goods, in my opinion a very vicious and indirectly expensive method of taxation, it would be of infinite advantage to trade that a sufficient duty should be retained, however small it might be, to pay the expenses of a Custom House establishment for the sake of the statistics to be obtained thereby.

The figures and facts which I am now going to place before you are taken from the annual statements of trade and navigation prepared at the statistical office of the Customs, and at the office of the Registrar-General of shipping; also from information that I have obtained through the kindness of Mr. Stephen Bourne, at the head of the statistical office of the Customs, whose acquaintance I made last year in the Economical Section of the British Association, of which he was a leading member; and from information obtained for me by Mr. Brent, at the head of one of the departments of the Custom House here, our very efficient secretary, who has spared no pains in the matter.

Beginning with the import trade as the most considerable, I will first give the figures and then explain their significance, which will consist in the comparison that they will afford—

1st. Between Plymouth trade as it is now and as it has been in previous years, enabling us to see the progress that we make.

2nd. Between Plymouth trade and that of other ports, enabling us to see what rank we take in the trade of the nation.

The value in money of the Imports into Plymouth from foreign nations and British possessions abroad has been, since 1872, before which date such statistics were not given—

<table>
<thead>
<tr>
<th>Year</th>
<th>Value in £</th>
</tr>
</thead>
<tbody>
<tr>
<td>1872</td>
<td>1,335,794</td>
</tr>
<tr>
<td>1873</td>
<td>1,582,349</td>
</tr>
<tr>
<td>1874</td>
<td>1,247,148</td>
</tr>
<tr>
<td>1875</td>
<td>1,452,459</td>
</tr>
<tr>
<td>1876</td>
<td>1,438,307</td>
</tr>
<tr>
<td>1877</td>
<td>1,725,974</td>
</tr>
</tbody>
</table>
It will be seen by these figures that our import trade has increased in value from £1,335,794 in 1872, to £1,725,974 in 1877. When we have good harvests there is a falling off in the value of our imports; but I shall show that the real increase in our trade corresponds with these figures, irrespective of the harvests.

There are 19 ports in England and Wales the imports of which in 1876 (the last return) reach £1,000,000 in value. They are, in the order of their importance—

1 London 11 Grimsby  
2 Liverpool 12 Goole  
3 Hull 13 Hartlepool  
4 Folkestone (London) 14 Gloucester  
5 Southampton (London) 15 Swansea  
6 Newhaven (London) 16 Rochester (London)  
7 Bristol 17 Plymouth  
8 Dover (London) 18 Littlehampton  
9 Newcastle 19 Cardiff  
10 Harwich (London)

Of these ports six are merely out-ports of London, being packet stations in constant communication with France and the Continent, the principal goods imported being in fact consigned to London, and of great value, but forming no part of their trade. This can be proved by the amount of Customs duties paid at those ports compared with the duties paid at Plymouth, which amounted in 1876,

At Folkestone  to £24,052  
Southampton " £59,528  
Newhaven " £10,596  
Dover " £32,012  
Harwich " £21,023  
Rochester " £6,583  
All below Plymouth, 1876 £63,260  
Ditto 1877 £63,926

With respect to Customs duties Plymouth stands twelfth in importance in England and Wales; and deducting the steam-packet stations which are out-ports of London, she stands eleventh in importance with respect to the value of the imports.

Although the Customs duties may be a good test to apply to the real significance of the enormous value of the imports at the steam-packet stations, they are not a good general test of
the trade done at particular ports; for while our trade has been increasing for twenty years, the Customs duties paid here have been diminishing, because the duties have been taken off the goods in which we principally deal. In 1853 we paid £191,267 in duties; in 1857 we paid £266,677 in duties. From 1850 to 1874 an enormous number of various duties were taken off, and in the last-named year the sugar duties were repealed, which reduced the amount paid here to, in 1875, £59,346; 1876, £63,260; 1877, £63,926, figures however which show a progressive trade.

While Plymouth ranks seventeenth in importance on the value of imports, including the out-ports of London, and twelfth in importance on the amount of Customs duties paid, she is seventh in importance taking both value of imports and Customs duties together, being only exceeded in both by London, Liverpool, Bristol, Hull, Newcastle, Grimsby.

I will now proceed to give particulars of these imports, which will show of what our trade consists and the countries with which we trade. I will give the particulars of the years 1857, 1860, 1865, 1870, 1874, and 1877. These dates have an air of irregularity about them which requires explanation.

The annual statement of the trade of the United Kingdom, prepared at the statistical office of the Customs, gives the imports in detail of the principal ports. In 1857 Plymouth was placed sixth among the principal ports, which were thirteen in number, and remained so placed until the year 1875, when Plymouth was struck out of the list of the principal ports altogether, and Dover and Newhaven, out-ports of London having but little trade of their own, were added; making fourteen principal ports in all instead of thirteen. The value of the imports at these packet stations is no doubt very high, and the principal ports are ranked probably according to the value of their imports, but this trade is London trade and not their own, whilst our trade is exclusively our own. The particulars of our imports for the years 1857, 1860, 1865, 1870, and 1874, I have taken from the published annual statements; and for the year 1877 I am indebted to Mr. Stephen Bourne, who has kindly supplied me with the information respecting Plymouth which is not now published.
In examining the statement of the import trade of the principal ports for the year 1874, when Plymouth was last included amongst them, I find that Plymouth stands so well in comparison with the others that there was no good reason for striking out of the list...
this only large western port. As a rule, London, Liverpool, and Bristol have by far the largest trade, and are the great centres of trade.

In 1874 the import trade of thirteen principal ports was given, and of those thirteen Plymouth ranks in importance in the import of

| Animals     | 5th  | *Cocoa     | 5th |
| Bones       | 4th  | *Coffee    | 4th |

* These two items are exceptional, as nearly the whole trade is done by London, Liverpool, and Bristol.

† Wheat † Beans  8th  11th
† Barley † Maize  7th  6th
† Oats † Flour    9th  11th
† Peas          10th

† We do a much larger trade now (1877) in corn.

| Fruit        | 7th & 8th | Eggs       | 9th |
| Guano        | 5th       | Potatoes   | 6th |
| Hemp         | 4th       | Rags       | 6th |
| Hides        | 6th       | Cubic nitre (nitrate of soda) | 4th |
| Oil          | 4th       | Spirits    | 5th |
| Petroleum    | 6th       | Sugar, unrefined | 4th |
| Butter       | 10th      | Sugar, refined | 7th |

† Beaten only by London, Liverpool, and Bristol.

| Tallow       | 5th       | Wood      | 10th |
| Tea          | 5th       |

The important trades in which we are beaten, but which are confined to a very few ports, are

Cotton . . Done chiefly at London, Liverpool, Folkestone, which last is London of course.

Dyes . . London and Liverpool.


Hides . . Dressed, or leather, London, Liverpool, Bristol, Southampton.


Rice . . London and Liverpool do all.

Flax seed, Linseed, and Rape seed . . Chiefly done in London, Liverpool, and Hull.

Silk . . London and its out-ports; at Folkestone alone the import of silk given in value was £3,339,771.

Spices . . London alone.
Tobacco. London, Liverpool, and Bristol, with Southampton, Goole, and Grimsby.

Wool, raw. An enormous trade done in London, Liverpool, with Southampton (London of course), Hull, Grimsby, Hartlepool added.

Wool, manufactd. London and Folkestone nearly all.

With these figures, there is no reason why Plymouth, the trade of which is an indication of the trade of the westernmost counties, should have been omitted from the list of principal ports, and the out-ports of London substituted.

I will now give a list of the countries with which this import trade of Plymouth is carried on, and from whence the goods came.

**Import Trade with each Nation (1876).**

<table>
<thead>
<tr>
<th>From</th>
<th>No. of Ships</th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>38</td>
<td>12,926</td>
</tr>
<tr>
<td>Sweden</td>
<td>21</td>
<td>7,050</td>
</tr>
<tr>
<td>Norway</td>
<td>16</td>
<td>4,654</td>
</tr>
<tr>
<td>Denmark</td>
<td>1</td>
<td>261</td>
</tr>
<tr>
<td>Germany</td>
<td>26</td>
<td>4,112</td>
</tr>
<tr>
<td>Holland</td>
<td>4</td>
<td>757</td>
</tr>
<tr>
<td>Belgium</td>
<td>22</td>
<td>10,930</td>
</tr>
<tr>
<td>France</td>
<td>310</td>
<td>19,327</td>
</tr>
<tr>
<td>Spain and Portugal</td>
<td>144</td>
<td>19,068</td>
</tr>
<tr>
<td>Italy</td>
<td>11</td>
<td>2,398</td>
</tr>
<tr>
<td>Austria</td>
<td>3</td>
<td>3,005</td>
</tr>
<tr>
<td>Turkey</td>
<td>37</td>
<td>18,903</td>
</tr>
<tr>
<td>United States of America</td>
<td>42</td>
<td>18,103</td>
</tr>
<tr>
<td>Mexico, &amp;c.</td>
<td>13</td>
<td>2,949</td>
</tr>
<tr>
<td>South America</td>
<td>25</td>
<td>3,517</td>
</tr>
<tr>
<td>Others</td>
<td>4</td>
<td>717</td>
</tr>
<tr>
<td>Channel Islands</td>
<td>89</td>
<td>3,599</td>
</tr>
<tr>
<td>India and Australia</td>
<td>3</td>
<td>2,084</td>
</tr>
<tr>
<td>British North America</td>
<td>39</td>
<td>25,991</td>
</tr>
<tr>
<td>British West Indies</td>
<td>2</td>
<td>744</td>
</tr>
</tbody>
</table>

849 167,095

The only comment I offer on these figures is that our trade with France is very large, and is carried on with a great number of small ships.

The following figures will show the progressive increase of our import trade, measured in ships and their tonnage, since 1860:

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Ships</th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1860</td>
<td>705</td>
<td>93,492</td>
</tr>
<tr>
<td>1865</td>
<td>668</td>
<td>81,086</td>
</tr>
<tr>
<td>1870</td>
<td>613</td>
<td>87,302</td>
</tr>
<tr>
<td>1875</td>
<td>983</td>
<td>151,244</td>
</tr>
<tr>
<td>1876</td>
<td>827</td>
<td>164,981</td>
</tr>
<tr>
<td>1877</td>
<td>944</td>
<td>188,700</td>
</tr>
</tbody>
</table>
The variation in each five years depends a great deal on the harvest. The increase since 1860 is double in respect to the number of tons, though the number of ships has increased at a much lower rate, indicating the use of a larger class of ships.

I now proceed to the export trade of Plymouth, which is small in comparison with the imports, as we have no great leading industry here, and our railway communication with the industrial centres is defective; but it is nevertheless considerable, and well worth our attention.

The value of our Exports was in

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1857</td>
<td>£49,201</td>
</tr>
<tr>
<td>1860</td>
<td>£33,914</td>
</tr>
<tr>
<td>1865</td>
<td>£29,814</td>
</tr>
<tr>
<td>1870</td>
<td>£67,077</td>
</tr>
<tr>
<td>1875</td>
<td>£95,084</td>
</tr>
<tr>
<td>1876</td>
<td>£117,430</td>
</tr>
<tr>
<td>1877</td>
<td>£131,650</td>
</tr>
</tbody>
</table>

These figures are taken from the published statistics of the Custom House to the year 1876; for the year 1877 I am indebted to Mr. Bourne. They are the value of the exports proper of the produce and manufacture of the United Kingdom; but our exports consist also of foreign and colonial merchandise re-exported, valued in 1877 at £33,724; the total value of our exports in 1877 was therefore £165,374.

Mr. Bourne has kindly supplied me with extracts from the Custom House statistics, which show that these exports consisted in 1877 of produce and manufactures of the United Kingdom exported.

<table>
<thead>
<tr>
<th>Quantities</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candles (cwts.)</td>
<td>2,085</td>
</tr>
<tr>
<td>Chemical preparations (arsenic)</td>
<td>....</td>
</tr>
<tr>
<td>Products of coal, peat, or shale</td>
<td>....</td>
</tr>
<tr>
<td>Leather, tanned (cwt.)</td>
<td>143</td>
</tr>
<tr>
<td>Machinery</td>
<td>....</td>
</tr>
<tr>
<td>Manures</td>
<td>....</td>
</tr>
<tr>
<td>Provisions</td>
<td>....</td>
</tr>
<tr>
<td>Soap (cwt.)</td>
<td>1,102</td>
</tr>
<tr>
<td>Spirits, British (gals.)</td>
<td>1,801</td>
</tr>
<tr>
<td>Sugar, refined (cwts.)</td>
<td>5,530</td>
</tr>
<tr>
<td>Other articles</td>
<td>....</td>
</tr>
</tbody>
</table>

Foreign and colonial merchandise re-exported—

<table>
<thead>
<tr>
<th>Quantities</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat (cwts.)</td>
<td>7,592</td>
</tr>
<tr>
<td>Barley (cwts.)</td>
<td>6,739</td>
</tr>
<tr>
<td>Maize (cwts.)</td>
<td>5,617</td>
</tr>
<tr>
<td>Guano (tons)</td>
<td>676</td>
</tr>
</tbody>
</table>
Manures (tons)    ...... 223 ...... £1,592
Cubic Nitre (cwt.) ...... 7,350 ...... £6,005
Petroleum (gals.)       ...... 13,586 ...... £837
Spirits, Foreign (gals.) ...... 1,476 ...... £709
Wine (gals.)           ...... 5,811 ...... £3,566
Other articles         ...... ....... ...... £4,677

The "other articles" mentioned in these lists amount in value to no less a sum than £59,868; and I am much indebted to Mr. Brent, the hon. secretary of this Institution, the Surveyor of the Customs here, for the kindness he has shown and the pains he has taken to supply me with some particulars of this large item in value.

Besides the articles enumerated our principal exports consist of malt, bran, china clay and fire bricks, starch, earthenware, pitch (? product of coal), slates, herrings, black lead, gunpowder, paper, sheep, biscuits, confectionary, cement, cotton manufactures, muskets, limestone.

The only comments I have to make on this list are, that the trade to the Channel Islands, which is large here, is ranked as an export trade; and the cotton manufactures and muskets, no doubt not our own local produce, and probably the only exports brought to this port by railway, were exported to Africa.

The progress of our export trade is shown by the number and tonnage of ships cleared, but I have only means of distinguishing those which cleared with cargo from those which cleared with ballast in the years 1875 and 1876.

<table>
<thead>
<tr>
<th>Year</th>
<th>No of Ships</th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1860</td>
<td>388</td>
<td>51,341</td>
</tr>
<tr>
<td>1865</td>
<td>365</td>
<td>47,624</td>
</tr>
<tr>
<td>1870</td>
<td>436</td>
<td>51,095</td>
</tr>
<tr>
<td>1875</td>
<td>Cargoes 275</td>
<td>23,436</td>
</tr>
<tr>
<td></td>
<td>Ballast 583</td>
<td>76,231</td>
</tr>
<tr>
<td>Total</td>
<td>858</td>
<td>99,667</td>
</tr>
<tr>
<td>1876</td>
<td>Cargoes 284</td>
<td>30,316</td>
</tr>
<tr>
<td></td>
<td>Ballast 434</td>
<td>78,966</td>
</tr>
<tr>
<td>Total</td>
<td>718</td>
<td>109,282</td>
</tr>
<tr>
<td>1877</td>
<td>Cargoes and Ballast 793</td>
<td>130,525</td>
</tr>
</tbody>
</table>

The progress of our export trade is thus shown to be from 388 ships of 51,341 tons in 1860, to 793 ships of 130,525 tons in 1877, and the increase in the cargoes exported, comparing 1875 with 1876, is about 7000 tons.
The coasting trade is next to be considered, and I must give some figures to show what an important trade it is, though it is impossible to state in this paper of what it chiefly consists; but if we glance at our imports it is not difficult to conclude from them what goods we must receive either by coast or by railway.

Our coasting trade has, like our imports and exports, been progressive. There were entered with cargoes coastwise—

<table>
<thead>
<tr>
<th>Year</th>
<th>Ships</th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1872</td>
<td>2710</td>
<td>451,322</td>
</tr>
<tr>
<td>1873</td>
<td>2872</td>
<td>494,347</td>
</tr>
<tr>
<td>1874</td>
<td>2702</td>
<td>470,657</td>
</tr>
<tr>
<td>1875</td>
<td>2824</td>
<td>515,103</td>
</tr>
<tr>
<td>1876</td>
<td>2874</td>
<td>500,656</td>
</tr>
<tr>
<td>1877</td>
<td>2754</td>
<td>514,718</td>
</tr>
</tbody>
</table>

Showing a progress from 1872 to 1877 of over 60,000 tons. In comparison with the coasting trade of other ports these figures place Plymouth very high.


Our coasting trade outwards is also large, but, of course, not so large as the inward trade, the difference between the inward and the outward trade being either consumed here, distributed inland, or exported to foreign countries.

There were cleared coastwise with cargoes—

<table>
<thead>
<tr>
<th>Year</th>
<th>Ships</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1872</td>
<td>1651</td>
<td>284,707</td>
</tr>
<tr>
<td>1873</td>
<td>1627</td>
<td>349,438</td>
</tr>
<tr>
<td>1874</td>
<td>1624</td>
<td>344,486</td>
</tr>
<tr>
<td>1875</td>
<td>1659</td>
<td>344,083</td>
</tr>
<tr>
<td>1876</td>
<td>1629</td>
<td>361,875</td>
</tr>
</tbody>
</table>

These figures show a progressive increase in the tonnage, with a decrease in the number of ships, indicating that larger ships are employed as we proceed. The outward coasting trade of Plymouth ranks in importance compared with other ports—In the United Kingdom, fourteenth; in England, eleventh. But if the coal ports are deducted, the coasting trade from which is enormous, Plymouth ranks ninth in the United Kingdom, and sixth in England. The trade inwards of coals here in the year 1876, which was of course coastwise, amounted to about 300,000 tons.
It thus appears that the coasting trade at Plymouth is a very large one, due to the facilities the harbour offers for shipping of all descriptions, and also due no doubt to the want of facilities for inland trade already noticed.

The Inland Trade is placed fourth in the division of our trade, and I can only describe it by giving the quantity of goods in tons which have been carried out from, and brought into, the Port of Plymouth by the Great Western and South Western Railways. In the year 1877 the Great Western Railway carried, outwards, 199,908 tons; inwards, 123,228 tons; South Western Railway, outwards and inwards, 31,516 tons; total together, 354,652 tons.

I will only add respecting this traffic that large quantities of corn, coals, and manure are distributed inland from here.

The fifth division of our trade—the Internal or Town Trade—consisting of all that we import or receive by land or by sea for our own consumption, needs merely to be noticed as a necessary division in an inquiry into the nature of our trade, separating our trade from that which is serviceable to the country at large from that which is only of service to ourselves. When we consider that we have a population of 150,000 within our port, ranking eighth in importance in the cities and towns of England, we may conclude that our internal trade is large. And as far as I have opportunities of judging I think it to be sound and good, not being subject to so many vicissitudes as the trade of other communities, who may be in the aggregate richer, but whose trade is often in a state of variation from excessive activity to extreme dulness.

The sixth and last division of the subject is the Shipping Trade, and to this I must invite your particular attention.

The number of ships which were entered at Plymouth for trade, including the foreign, British possessions, and coast trades, both with cargo and in ballast, were—

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871</td>
<td>3485</td>
<td>548,224</td>
</tr>
<tr>
<td>1872</td>
<td>3593</td>
<td>571,147</td>
</tr>
<tr>
<td>1873</td>
<td>3709</td>
<td>623,855</td>
</tr>
<tr>
<td>1874</td>
<td>3522</td>
<td>596,410</td>
</tr>
<tr>
<td>1875</td>
<td>3825</td>
<td>669,298</td>
</tr>
<tr>
<td>1876</td>
<td>3723</td>
<td>667,751</td>
</tr>
<tr>
<td>1877</td>
<td>3698</td>
<td>703,508</td>
</tr>
</tbody>
</table>
These figures show a progressive increase in the tonnage, with a smaller increase in the number of ships, indicating that the ships employed are larger as the trade increases.

Comparing these figures with corresponding ones at other ports, we rank tenth in importance in England and Wales; London and Liverpool having by far the largest trade of all, and three ports in Scotland and three in Ireland exceeding ours.

I have already given our trade with each nation with respect to our imports, showing from what countries our imports came, and I now give the shipping of each nation entered at Plymouth during the year 1876. There were—

<table>
<thead>
<tr>
<th>No. of Ships</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>British</td>
<td>544</td>
</tr>
<tr>
<td>Russian</td>
<td>4</td>
</tr>
<tr>
<td>Swedish</td>
<td>6</td>
</tr>
<tr>
<td>Norwegian</td>
<td>61</td>
</tr>
<tr>
<td>Danish</td>
<td>11</td>
</tr>
<tr>
<td>German</td>
<td>25</td>
</tr>
<tr>
<td>Dutch</td>
<td>3</td>
</tr>
<tr>
<td>French</td>
<td>151</td>
</tr>
<tr>
<td>Italian</td>
<td>26</td>
</tr>
<tr>
<td>Austrian</td>
<td>9</td>
</tr>
<tr>
<td>Greek</td>
<td>4</td>
</tr>
<tr>
<td>United States of America</td>
<td>4</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
</tr>
</tbody>
</table>

The shipping belonging to Plymouth is not so large now as it used to be before wooden ships were superseded by iron ones, and before sailing ships had steamships to compete with them. Plymouth still, however, stands well. There were in 1876, belonging to Plymouth, 371 ships of 43,405 tons. According to these figures Plymouth ranks seventh in England and Wales, and twelfth in Great Britain, in the number of ships belonging to the port; but thirteenth in England and Wales, and twentieth in Great Britain, in tonnage. The tonnage of the great steamship-owning ports being very heavy, London and Liverpool in this respect, as well as in every other, take the lead far away from any other ports. Bristol owns fewer ships than Plymouth, with but a slightly larger tonnage.

As a shipbuilding port Plymouth has naturally declined since iron has been so much used in building ships. Plymouth used to have a high and well-deserved reputation for the ships built here, when the wooden walls of England were launched from the Dock-
yard, and the "stately ships," as Tennyson calls them (he must have meant sailing ships), were launched from our many building yards.

In 1876 eleven ships were built here, which were no more altogether than 1,272 tons. Yet Plymouth stands eighth in importance of the wooden ship-building ports, the highest being Sunderland, with twelve ships, of together 4,291 tons.

The iron, sailing, and steam-ships are built chiefly at Liverpool, Stockton, Sunderland, the Tyne Ports, Dundee, Glasgow, Greenock.

We had engaged in the Fishing Trade, registered under the Sea Fisheries Act, 1868, in 1876, three hundred and sixty vessels and boats of 3,153 tons.

These figures place Plymouth tenth in importance in England and Wales as a fishing port. It is a curious fact that all the ports which have a larger number of vessels, or tonnage, engaged in the fishing trade than Plymouth are to the eastward, none to the westward, and are all but one (Dartmouth) on the east coast of England. The number of fishing-boats is an indication of the fishing industry of Plymouth, and not of the fish trade, which is much larger than these figures represent, the fish caught on a great extent of coast being landed here.

The harbour of Plymouth being so fine and so accessible, as already described, a very large number of ships put into the port for various purposes, as the Sound often testifies, which are not, technically speaking, entered at the Custom House, but merely enter the harbour.

In the year 1877 sixty-six of the finest ships afloat arrived here to embark, for Australia and New Zealand—

<table>
<thead>
<tr>
<th>Class</th>
<th>Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-class passengers</td>
<td>567</td>
</tr>
<tr>
<td>Second and third-class</td>
<td>924</td>
</tr>
<tr>
<td>Free and assisted emigrants</td>
<td>13,275</td>
</tr>
<tr>
<td><strong>Total emigration from Plymouth</strong></td>
<td><strong>14,766</strong></td>
</tr>
</tbody>
</table>

In 1877 two hundred and eighty-three steamers put into this port to land or embark passengers, goods, and mails from and to foreign countries, calling regularly, belonging to

The Royal Mail Steam-packet Company.
The Hamburg-American Steam-packet Company.
The Union Steam-packet Company.
The Donald Currie & Co. Steam-packet Company.
The Bristol Screw Steam-ship Company.
The Direct Line (Demerara) Steam-packet Company.
The T. Jones Stevens & Son's Steamers.
In 1877 fifteen hundred and ninety-eight steamers arrived coastwise, also calling regularly, to land and take on board passengers and cargo from and to Ireland, London, and other places, belonging to the following Steam-ship Companies:

- British and Irish Steam-ship Company: 416
- Cork Steam-ship Company: 192
- Liverpool and London Steam-ship Company: 262
- Clyde Steam-ship Company: 520
- Channel Islands: 804
- Kingsbridge: 104

Last but not least in importance of the functions that Plymouth performs, in taking her part in the trade of the world, is the protection the splendid harbour affords to the shipping of all nations as a port of refuge, either in the case of contrary winds and bad weather, or in the case of damages sustained at sea from storms or collisions, or as a port of call. If the shipwrights do not build many ships, they repair a great number; and I have good reason for stating that Plymouth is one of the best harbours of refuge in the world. The activity in this branch of trade, which includes the trade with steamers calling here to take in coals on their voyages at a distance from coaling ports, and ships calling for orders, is very great. It keeps a fine body of highly-skilled pilots in constant employment, a vocation which must be ranked, with seamanship, amongst the principal industries of Plymouth. The trade which is the result of the number of ships that enter the harbour of Plymouth, either to take in coals for their engines, to receive orders, to avoid contrary winds and bad weather, or to repair damages, is not ascertained from statistics, but is undoubtedly of very great importance.

I have not specially mentioned the trade incidental to the Dockyard, or the other Government establishments, because it is manifest that the supply of their wants must be an important part of the trade of this port, and is included in the imports, exports, coasting trade, &c. They, of course, constitute a striking part of the industries of Plymouth. The finest part of the harbour, Hamoaze, is, as already noticed, occupied almost exclusively by the Government. Whether it would be better employed in promoting trade than in protecting, not only trade, but all the interests of the nation from foreign aggression, may be a matter of speculation; but assuredly at the mouth of the English Channel, at present
one of the most important spots on the earth’s surface, a strong protecting force is needed until the reign of universal peace is proclaimed.

The conclusions to be drawn from this report to the Plymouth Institution on the trade of the port, for it is more a report than a lecture, are, that London, Liverpool, Bristol, Glasgow, Dublin, and Belfast, being the greatest trading ports of the United Kingdom, Plymouth stands high in comparison with all others, supplying the wants of the very large district which constitutes the south-western counties of England. That as a harbour Plymouth is now, and has been for centuries, the means of affording protection to the merchant fleets of this nation in times of war, and a refuge for the fleets of all nations in times of peace. And that Plymouth is the favourite harbour from which the English race depart to carry their free institutions and energetic habits of industry to all quarters of the earth. We must be ceaseless in our endeavours to improve the harbour, and to adapt it to modern requirements, from the Eddystone, which ought to be a signal station, to every wharf or pier where the water reaches. And we must promote all improvements in our railway communication inland.

We must remember that we have a function to perform which is in accordance with the structure of this harbour, one of the finest and best situated harbours in the world, and that it is for us to adapt it to modern requirements. We must look seaward for our prosperity.
A few notes on the various handbooks of this neighbourhood published from time to time during the last eighty or ninety years may not be uninteresting. For some little time past I have been collecting books of this kind, and I have the pleasure of showing to the Society this evening copies of nearly all, if not the whole of, those that have been printed.

The earliest handbook that I have met with is, "The Plymouth Dock Guide, or an Authentic Account of the Rise and Progress of that town, with the Dockyard, and whatever is worthy of notice in the towns and villages surrounding it, as Plymouth and Garrison, Plympton, Saltram," and so on; "likewise the times of coming in and going out of the mail coaches, diligences, waggons, &c.; to which are added distances of roads from Plymouth Dock to several of the principal cities and towns in England, especially such as are west of London. Plymouth Dock: printed by and for E. Hoxland, bookseller and stationer, next door to the Fountain Inn, Fore Street." The date of this is 1791. It is a small 12mo volume of eighty-six pages, in rather large type, including three pages of catalogue of Mr. Hoxland's stock, mainly patent medicines and perfumery, but which seems to have also comprised stationery, musical instruments, umbrellas, and parasols. In spite of the length of the title the contents are meagre. The first ten chapters relate to Plymouth Dock, and contain a description of the town, the yard, church and chapels, and places of amusement. Chapter eleven is headed, "Places out of the town," which prove to be Stoke, East Stonehouse, and Plymouth. The remaining four chapters contain accounts of Mount Edgecumbe, St. Germans, and other places adjoining.

No doubt this little book was found of use, and had a ready
sale; for it was not until 1812 that another Guide was published. This also was printed at Plymouth Dock, by A. Granville and Son, Britannia Office, 50, Fore Street. It was entitled, "A View of Plymouth Dock, Plymouth, and the adjacent Country," and although on much the same plan as its predecessor, was a very much better production, and contained what the other wanted—a good map of the neighbourhood. It was in 12mo, and contained 136 pages.

In the same year, 1812, the first handbook to Plymouth was published by Rees and Curtis, well-known booksellers of Plymouth, whose enterprise led them to issue new and revised editions of Prince's "Worthies," Risdon's "Devon," and other valuable works. The guide was entitled, "The Picture of Plymouth," and although no author's name appeared on the title-page, it was well known to have been written by Mr. Henry Woollcombe. Besides the general information which it gave, it contained numerous suggestions for the improvement of the town. It was accompanied by a map, and that, showing the comparative importance of the two places at that period, not of Plymouth, but of Plymouth Dock.

In 1814 a Directory of the Three Towns was published by the Rowes, successors to Rees and Curtis.

Nine years after the publication of Mr. Woollcombe's "Picture of Plymouth," in 1821, the "Panorama of Plymouth," by the late Rev. Samuel Rowe, saw the light. It had a rapid sale, and a second edition was soon called for. The new edition was, and still is, a valuable book. It was not only a handbook to the Three Towns, but it also contained full and well-written descriptions of the surrounding neighbourhood, and well-engraved plans and maps. This book, although of course much of the information is obsolete, remains even after the lapse of half a century unrivalled.

In 1822 N. Taperell published his "Plymouth, Plymouth Dock, Stonehouse, and Morice Town Directory." Prefixed was a list of public offices, and it seems to be a carefully compiled book, and well printed. Although large numbers of these handbooks and directories must have been issued, all are now remarkably scarce.

All the succeeding handbooks appear to be modelled, some with and some without acknowledgment, upon the "Panorama." In 1823 appeared Johns' "Tourist's Companion," having in addition to the Guide to the Three Towns and their vicinities, a Directory.

In 1828 Henry E. Carrington published the first edition of his "Plymouth and Devonport Guide." In this a new feature was
introduced—lithographic views of places of interest, from drawings by Worsley. This book was a well-written one, and as successful as any of its predecessors. Five editions, at least, were printed between 1828 and 1843. In the last a new set of drawings took the place of those by Worsley.

In 1829 Johns, of Devonport, issued another "Tourist's Guide," which was written by John Sanford. This also contained engravings; and one of Worsley's, which was in Carrington's book, has somehow got in here also. Some little time after, the part of this Companion relating to the vicinity only was published separately, by Mr. E. Nettleton, of Plymouth.

In 1830 a very interesting book was published, "The Plymouth, Stonehouse, and Devonport Directory," by Robert Brindley, architect and surveyor, Devonport. Besides the usual information of a directory it contained a chronological account of the principal events in the history of the towns, and a list of the mayors of Plymouth.

In 1836 Nettleton's "Guide to Plymouth, Devonport, and Stonehouse, and the neighbouring country," by the late George Wightwick, was printed; a very nice little work, with characteristic engravings.

Since this time several handbooks for the Towns and neighbourhood have been written by Mr. Jewitt, Mr. Worth, and others, and published by Luke, Brendon, Wood, Besley, and others; but strangely enough none on such a scale as most of those to which I have referred.

The guide-book literature is creditable to the neighbourhood. All that I have mentioned, with the exception perhaps of the two first, contain a great deal of matter of more than ephemeral interest, and were compiled by men whose love for their town and interest in their subject induced them to do something more than merely lend their names to a printer's speculation.

The publication of the handbooks of Murray and Black has to a great extent done away with the necessity for the more diffuse local guide, and as a rule the stranger to any neighbourhood provides himself with the means of acquiring information before his arrival in the locality. Still I believe that a well-written book, combining the handbook and the history, is a want; and that if undertaken now, and properly done, it would prove a commercial success.
PLYMOUTH, for a town of such antiquity, has very little ancient heraldry to show. The achievements of arms which we may well imagine once adorned the mansions of the thriving burghers, who either came of good families or had risen in their social status to the once very real dignity of armiger, have almost without exception passed away. Far more of the older heraldry of Plymouth is to be seen and learnt within the walls of St. Andrew Church than elsewhere in the town. That, however, has been exhaustively dealt with by Mr. J. Brooking Rowe; and I shall refer only to some of the fragments he has left upon secular territory. By and by, when complete, the armorial enrichments of our Guildhall will be worth a note; but I do not now intend to speak of matters so recent.

The oldest armorial bearings specially associated with Plymouth are those of the town itself—as they were, by no means as they are. The present arms of Plymouth are of very modern date, though they do embody the more ancient ensigns. Like other seaports of the West—Dartmouth, Fowey, Looe, Truro, Saltash, among the number—when Plymouth became corporate it adopted a ship as its device. There is still extant an impression of a seal to a deed of 1368, which bears a ship on the waves, and purports to be the seal of the community of Sutton-upon-Plymouth. And so in the Visitation of 1574 we find a three-masted ship on the waves, the masts surmounted by fire-beacons, given as the arms of the town. Long before that date, however, Plymouth had set up a rival coat. The oldest seal now in being, disused only when the Municipal Reform Act came into operation, has no such device. I am inclined to believe that this was the seal provided when the town was chartered by Act of Parliament, 1439-40. It may be
necessary to repeat that there was a corporation here many years anterior to this date; and that what the act-charter did was simply to bring the entire community under one jurisdiction, to link the fortunes of Sutton Prior, which until then had remained under the sway of the monks of Plympton, with those of its elder sister, Sutton Valletort, or Vautier, on the slopes above, on the site which we now call Old Town Street, but which was known within living memory simply as Old Town.

The seal itself seems to indicate something of its history. It is mixed ecclesiastical and civil in character. In the centre under a Perpendicular canopy is St. Andrew, the patron saint of the town, fit protector for a community of fishermen. Under a similar canopy on the right is an angel with a shield, bearing a cross of St. George. Under a third canopy on the left is another angel, with a shield of the royal arms, France and England quarterly. Beneath, in the exergue, is an escutcheon of the familiar coat, a saltire between four castles, with two lions as supporters. The legend is, as badly spelt as the whole workmanship is rude, "THE : COMEN : SELLE : OF THE : BOROUGH : & : COMENALTE : OF : Y" : KYNGS : TOWNE : OF : PLYMOTHE." Here then it seems to me are all the marks of a change and a compromise. St. Andrew retains his superior place as patron; but Plymouth is the king's town for all that. And the same idea is repeated in another ancient seal, which for a while seems to have displaced this one: a seal bearing the saltire and castles on an escutcheon surmounted by a crown of fleurs-de-lis, the field filled in with Gothic tracery. This is the common seal described in the Visitation of 1620; but the inscription there given plainly indicates that it was the seal of the mayor: S$: offictt: maforatus : borgt : ville : Uni: regis: De: Plymovth. It is of decidedly superior workmanship to the seal first-named, but received intentional damage, probably during the Commonwealth, by the words "dni. regis" being battered out. Perhaps this was the reason why the St. Andrew seal was taken into use again, if indeed it had ever been totally abandoned; though the description of that with the simple armorial device, as the common seal, in the Visitation, leaves little doubt on that head.
It is easy to see where the charges of the castle coat came from. The saltire is, of course, the cross of St. Andrew; the castles represent clearly the four towers of the "castle quadrate." This was erected, or at least commenced, early in the fifteenth century, under the fostering care of Bishop Stafford, 1395–1419, whose armories—Or a chevron gules, perhaps with the appropriate motto "Gard ta foy," Risdon says were "lately to be seen in the work," of which the townsfolk were doubtless very proud, and into which in time of danger the Corporation used to go for residence.

The present borough seal bears both the coats described, but not combined in all respects in true heraldic fashion. The castles and lions have been put on board the ship, which floats lightly notwithstanding its strange cargo, and the crown of fleurs-de-lis has been adopted as the crest, garnished with six flags of the town arms, supposed to symbolize the six wards. One unfortunate result of the combination is that the purpose of the beacon-crested masts has been forgotten. They have apparently been mistaken for brooms—such perchance as those which Van Tromp hoisted—only it so happens that, as in one of the chief carvings of the Plymouth coat at the New Guildhall, the middle broom is sometimes left dependent on nothing, the mainmast being severed in the midst, while the object of the mizen and fore masts seems simply to be the affording holdfasts to the lions' tails. I cannot trace the town motto, "Turrīs fortissīma est nomen Jehova," further back than the days of the Commonwealth; and probably it was adopted then in memory of the great mercy vouchsafed to the townsfolk during the siege. Perhaps we owe it to the suggestion of Hughes, the Puritan vicar.

Next in point of antiquity, without doubt, are the fragments of armorial glass still remaining in the windows of the Free Library. These are the sole relics now left of the old Jacobean Guildhall in Whimple Street, which supplanted its humbler predecessor about the year 1607, and ran the Corporation terribly in debt, as the records of that date grievously show. By the way I am not at all sure that there may not be portions of the previous Southside Street Guildhall still in being. It is quite possible that the portion of the distillery which in the seventeenth century was occupied as the town Marshalsea, and which has been assigned to the Dominicans, may have had a civic origin; and that the Dominicans may have had another habitation hard by. But to return to the old
Guildhall glass. In one window there are the royal arms with the motto "Beati Pacifici." Elsewhere we have the Prince of Wales's plume, and the town arms. The other fragments are somewhat obscure. One coat is—Gules a chevron argent between three cinquefoils (or fleurs-de-lis) or. Another is—Or a chevron vert between three goat's heads erased sable, which I take to be intended for the bearings of White, and which therefore possibly commemorates John White, the generous haberdasher who, in 1585, gave the Mayor of Plymouth and his brethren the Union cup, "to drinke crosse one to ye other at their feastes and meetings"—a custom which, in spite of all reforms, it is said that they most religiously observe. There is a third coat—Gules, two gemelles argent, a star in the dexter chief, and another in the base point. The arms of Sir John Gayer, alderman of London, appear on the cup which he gave to the Corporation in 1648.

A search for seals among the Corporate documents produced little fruit. Lawrence Roylland uses a seal with a dragon to a deed of Howe's Charity; there is a seal of Drake, quartering his new coat, the fesse and pole stars, with the original wyvern; William Weeks, 1675, uses for device a quiver with three arrows; Robert Berry, 1696, has—Ermine, a bend, charged with three fleurs-de-lis. Henry Wallis, vicar, in 1604, attaches a seal with a variation of the old merchants' mark, used in the county in connection with the woollen trade, with the initials B. R. This he had evidently borrowed. The mark somewhat resembles a written figure four, with the horizontal line crossed by two perpendicular strokes instead of one, the inner stroke of the two much longer than the slanting one.

There are still remaining a few armorial shields, carven in stone, which have survived the beat of the weather, and the neglect and ill use of man. The most interesting of these is the Drake coat, now built with other fragments of the original Old Town Conduit into the wall of the reservoir in the Tavistock Road. It is the well-known fesse wavy between the two pole stars, emblematic of the famous voyage of circumnavigation; the Drake arms, not as borne by Sir Francis but by his brother, for our great Devonshire hero—as the seal already cited testifies—always quartered the arms which his sovereign gave him in honourable augmentation, with his ancestral bearing of the wyvern or dragon. The fesse and stars are to us far more worthy than the augmentation of honour granted to
his kinsman Hawkins, who to his lion passant, his bezants, escallops, and pilgrims' staves, added "a demi moor proper, bound and captive."

Built into the wall in Saltash Street is a much injured carving of the town arms; and on the old key-stone of the Friary gate—now removed, and the property of this Society—we have Sparke—Chequy or and vert, a bend ermine, impaling Rashleigh, which also occurs in the Old Church. And, by the way, it was in the Church of the White Friars that some of the evidence was taken by the Commissioners who sat to inquire whether Scrope or Grosvenor had a right to the famous coat—Azure, a bend or.

Over the main entrance to the Citadel are the three rests or clarions, the arms of the Grenvilles. They owe that position to the fact that John Grenville, Earl of Bath, was governor while the work was in hand.

William Cocke, of Plymouth, who commanded his own ship at the defeat of the Armada, was the only man of note who was killed in that fight. The arms of this family, once of great worth in Plymouth, were, it is stated, lately to be seen on an inner doorway of a house in Southside Street. I have, however, searched for them in vain. The bearings are—Argent a chevron engrailed between three griffins' heads erased gules, on a canton azure an anchor or.

Nothing in this connection has puzzled me so much as a shield fixed to the wall of a house in the opening leading to the Old Tabernacle in Briton Side, or, as we are now made to call it, Exeter Street. The arms are Spanish; but I cannot ascertain the date or the occasion. They are a lion and castle quarterly, for Castile and Leon, and an escutcheon of pretence charged with fleurs-de-lis for France, the whole enclosed by the collar of the Golden Fleece.

There is an exceedingly interesting panel of arms painted on plaster at the Workhouse, containing in all forty-four shields. Originally they were in the court-room of the Old Workhouse (the memory of which, and of its piously mottoed gateway, "By God's help through Christ," is so rapidly passing away), and were removed to their present position with loving care by Mr. Peter Bellamy. They are abominably drawn, the tinctures faded and in some cases incorrect, and, as the paint is peeling from the plaster, they are rapidly hastening to decay. It is well therefore that they should be put upon record; for they were intended to preserve the
pious fame of the benefactors of the Hospital of the Poor's Portion, and they are not the least interesting of our historical links with the past. I have not been able to identify all; but among those which are clear are the bend lozengy ermine of Hele, the great educational benefactor of Devon; the three hands gules of Recorder Maynard, his trustee; the saltire gules and crosses formee sable of the once thriving merchant family of Stert; the three oak leaves granted to the Trelawny for their services at Agincourt; the three eagles of Fownes; the lion rampant gules of Pomeroy; the golden fesse of Waddon; the fleur-de-lis and mullet of Gayer; the ermine bend of Sparke; the three horseshoes of Ferrers; the talbots of Martin; the azure chevron of Bastard; the counterchanged lions of Byng; the stags courant of Rogers; the quartered shield and lion of Pollexfen; the rooks of Rooke; the pierced cross and lions of Buller; the eagles and bend of Nicholls; the castle of Lanyon; the ermined chevron of Amadis; the chequers of Chichester of Raleigh; with the coats of Symkin, Palmer and Addis, Seward, Tyes, Warren, Cayne and Cross, and others of less prominence or more uncertainty.

A few escutcheons of arms appear on the tokens issued by Plymouth traders in the seventeenth century. Apart from craft coats and the town arms, we there have: Henry Clarke, a lion rampant; John Cooke, a chevron between three pears; Ralph Gordge, three gurges (?); Roger Oliver, a chevron between three trees, each on a mount; William Tom, three bucks' heads, couped, crest a chough. Some of the issuers used the signs of their houses for devices.

Finally there are several families which heraldically are specially connected with Plymouth. Some of these are mentioned in the general heraldic records. Others find place in a seventeenth century MS. of doubtful heraldic authority at the Plymouth Public Library. Plymouth families of coat armour mentioned therein, are Amadas, Ceely, Colvile, Cocke, Bagge, Skelton, Jennings, Martin, Opye, Baron, Edgecumbe, Clement, Edmonds, Fownes, Waddon, Whitaere, Harford, Treville, and Huxham.
The last of the old almshouses of Plymouth, “the Twelves,” at Coxside, founded by Colonel Jory in 1703, will shortly be taken down; and before the building becomes a thing of the past I have made a measured drawing of it. There is nothing very remarkable about it; but, like a piece of old china, it was yearly acquiring a certain value from an antiquarian point of view. Anything, too, erected in the reign of Queen Anne has just now an interest to those who are curious in “style.” The building consists of twelve small residences, forming a row 180 feet long, each cottage having a room on the ground-floor, and a bedroom over, with its dormer-window in the roof. The walls are of limestone, with granite dressings to the square-headed doorways and windows, each of the latter being of two lights, divided by a granite mullion. In front of the row are small gardens, bounded by a granite-coped wall against the road; and in the centre of this wall is a picturesque granite doorway, with this inscription on the pediment: “These twelve charity houses, with an Endowment for Ever for the support of twelve Widdowes, are the sole gift of Joseph Jory, Esquire, native of Plym® Anno Domini, 1703.” Altogether this almshouse group which we are about to lose is a quaint and interesting structure.

Along with the building will be taken down a row of fine old elms, probably almost as old as the almshouses. Their removal is probably quite necessary for the railway extension, but we should not be the less sorry to lose them. However much we may differ about this or that building, there are few, it may be hoped, who do not look upon a fine old tree, which perhaps has taught us the lessons of the seasons from our infancy, as

“A thing of beauty, and a joy”}

as long as it lasts. A great many trees have of late years been
very needlessly taken down in Plymouth, and a great many more have been barbarously hacked and mutilated; in fact, Plymouth is fast becoming a treeless town. The old trees have been removed, and few young trees are being planted.

The buildings too, with the indubitable marks of periods which have made Plymouth famous in history, are being rapidly swept away; and in a few years we shall look in vain for a single domestic building which could have been familiar to Sir Francis Drake when beating the borough bounds, to speak of no earlier time.

Since I read a paper before this Society, some fifteen years ago, on "The Ancient Buildings of Plymouth," we have lost Hoe-gate, the thirteenth century remains of the White Friars, the Turk's Head (a mediaeval hostelry), the Hospital of the Poor's Portion, the Old Grammar School, the almshouses in Green Street, an Elizabethan house in Notte Street (not the fine house of that period), and a lot of other buildings more or less intimately connected with the past history of the town. The next important old structure to go will probably be Palace Court, of which an excellent wood-cut has appeared this year (1878) in the Graphic. Although at present it is anything but a decent habitation for Christians, yet we believe this to be the house mentioned by Leland as "the goodly house towards the haven, where Catherine of Arragon stayed whilst here," and where she was entertained by John Painter, then late mayor. Recently a window has been placed in the New Guildhall, representing the reception by Painter at this Palace Court of the princess and her retinue. The doomed building is admirable from an artistic point of view, being the most picturesque of the few old structures left in Plymouth.

A very old and curious street—the oldest, I almost think, in the town, though it is called New Street—has lost many of its peculiarities since I wrote last on this subject; and there are, I think, only one or two small houses left with the very ancient arrangement of cellar and solar, the latter approached, not by an internal staircase, but by stone steps outside the building. Rarely, except in the earliest existing examples of English domestic architecture, do we find this picturesque arrangement.

Some of our streets have lost their old historic names; Briton Side has merged into Exeter Street, and (more recently still) White Cross Street into North Street. The Society will agree
with me that this is no improvement. Those who are answerable for these changes ignore the history of their own town. They should have been content to alter some of the grand modern names of streets, calling plain places by plain names, instead of after kings, queens, and regents. How misleading to a foreigner, for instance, some of them must be. "Pray direct me de nearest way to King Street; I wish to see where de grand people live."

There are still some Elizabethan houses in Plymouth. Most of them have been mutilated and defaced in the vain attempt to make them look modern. The grand old house in Notte Street remains intact, in almost all its original external beauty. Isolated it certainly is; but like an oasis in a desert of stucco and houses barren of interest. So famous has this house become, that an artist this year (1878) has come from the North of England expressly to make measured drawings of it, with the view of producing an exact copy of this finely-proportioned and picturesque building.

Quaint fragments of ancient Plymouth are occasionally to be found in courts and alleys branching off from some of the old thoroughfares of the town. Mr. Worth, in his interesting Graphic description of Plymouth (March, 1878), directs attention to an Elizabethan court off Briton Side, and to a curious tablet, a relic of the Armada days, on one of the house-fronts, having on it "the arms of Spain, Castile and Leon quarterly, with an escutcheon of pretence bearing three fleurs-de-lis, and surrounded by the collar of the golden fleece."

Later in the seventeenth century, and after the siege, a good many houses must have been built in Plymouth, but of these there are few existing examples; Messrs. Hawker's business premises bear date on a granite slab, 1655. Several houses of the reign of Queen Anne remain, and nearly all the buildings of that period have the dates on them, either on a slab or, more commonly, on the archstones of the windows. On the keystones of a brick house in Briton Side, a little to the west of the "King's Arms," is the date 1706. In Batter Street there is a house (formerly the Manse to the Chapel adjoining) with the date 1708 on four keystones, and the initials "I. M." on the keystone of the central window. In Treville Street, adjoining the entrance to the new Board Schools, are some remarkable timber-fronted houses, having—with their overhanging eaves, projecting more than three feet, and dormers in the roof—quite a Continental look. On a corner-stone are the same
letters "I. M. 1701." Who was this enterprising Plymothian of Queen Anne's time? Was it John Munyon, chosen Mayor of Plymouth in 1692, and again in 1696?

But the finest house in Plymouth of the Queen Anne period is the one in Notte Street, on the opposite side to that of the Elizabethan house, and set back from the line of the street. The front is entirely of Portland stone, and the details are exceedingly good. It is probably the best built house in Plymouth of the last century. Here lived for many years Cookworthy, of china clay and Plymouth pottery fame. Can you not picture him?—the quiet Quaker in his drab suit, seated in his wainscoted parlour before the (yet remaining) fireplace with its blue and white Dutch tiles, thinking, it may be, very seriously over the difficult problems he has determined to solve in chemistry; or, as his eye rests on the glazed tiles with their rude delineations of sacred incidents, proposing to himself some higher adaptation of the ceramic art. In an excellent brick-fronted house in Howe Street, ornamented by some good moulded work, also in brick, lived the famous admiral, Lord Howe, and Lady Howe. The late President of the Royal Academy, Sir Charles Eastlake, was born in a corner house on the Parade, now occupied by Mr. Tucker. Such facts should be recorded on tablets placed outside these houses. They surely give interest to a locality, and the memory of illustrious Plymothians should ever be cherished.

The history of Plymouth during a large part of the last century was very much written on the rain-water pipes. These things are now mostly made to a few patterns, and you may see ten thousand of them all alike in any county of England, and you know exactly from what cast-iron foundry they all come. It was not so a hundred years ago. There was a great deal more individuality shown then in these little things. The cistern head of a rain-water pipe outside a well-known house of business in Southside Street has "J. C. 1782" stamped on it; another in the same street, "1773"; and one outside a good brick house on the Barbican, "1770." In Exeter Street is an important house with an open central court (formerly occupied by Messrs. Treeby), the date of which is determined by the stamped figures on a lead pipe under the eaves—1768. The rain-water pipes in Ham Street tell us when some of the houses were built there—1784; and others also in and near Green Street, when some of the houses there were erected—1786.

There are several reasons why the houses of the last century are
entitled to our respect; one is, that they are usually so well built, that if by any chance one of them should tumble down, the rest in the row do not necessarily follow—like a pack of cards. Speaking of cards, in an upright slated house in Kinterbury Street, one of the Queen Anne builders has cut his slates to the patterns of playing cards, in spades, clubs, diamonds, and hearts—a good method of enlivening a somewhat dreary-looking material.

There is even a plaster front of the last century in Southside Street which shows some individuality. The design consists of knobs of the size of a limpet, and about that shape, arranged in a circle of increasing concentric rings. The effect resembles the ripples arising in water when a stone is thrown in, only there are of course breaks in the continuity of the ripple waves. The spaces between the rings are regular, those between the knobs irregular.

These are some of the old-fashioned bits of Plymouth, which no doubt in the course of a few years will be much less numerous than they are even now; and there are a few other nooks and corners of the Old Town, unnoticed in this brief paper, which (on the supposition that they survive twelve months longer) I reserve for a future occasion.

Plymouth possesses one important ancient structure, and is likely to possess it for centuries to come. Under its shadow the place has grown from a mere fishing village to its present position among the large towns of the kingdom, and whilst it impressively reminds us of the past, it bids us look forward to the future. Like the bells of St. Andrew's, which

"Ring out the old, ring in the new,"

let us welcome that future, if it brings to the inhabitants more health for the body, more happiness for life, more beauty for enjoyment.
The sketches here given illustrate an interesting little well-chapel which is known to very few persons, although it is situated close to a public thoroughfare, and within the most beautiful and (thanks to the noble possessor) the most frequented domain in the "West Countrie." It is on the left hand side of the road leading from Cremyll to Maker, and the water, which flows from a spring, supplies a cattle trough built into the hedge.

Buildings of this kind (usually erected over wells resorted to for the healing powers of the waters) are numerous in Cornwall, and most of them have been described and illustrated in the county works; but this interesting example has hitherto escaped all public notice. As will be seen by the plan, the internal dimensions are only about six feet by four and a half feet. The structure had an arched stone roof (a part of which remains), with a central chamfered rib, resting on moulded corbels. Opposite the doorway and over the well is a niche, which probably contained an image of the patron saint. In one of the side walls is also another small arched recess. The details indicate that the building was erected early in the fourteenth century. The proportions are very pretty; and one cannot but admire the taste and care bestowed by the mediæval masons on even such a lowly little structure as this.

The plain masonry is of local stone, the moulded work of green freestone, probably from St. Germans. Between the freestone dressings internally the walls and arch were plastered, and portions of this ancient covering remain.
PLAN OF CHAPEL.

DOORWAY.
ST. JULIAN'S WELL-CHAPEL, MOUNT EDGCUMBE.

NICHE OVER WELL.

RECESS AND CORBEL IN SIDE WALL.
The death-rates in the Tables below, and in those of last year's "Journal" (1876-7), should be read as "per 1,000 per annum;" being a more convenient expression than "per cent. for ten years," used at pages 84 and 102 in the "Journal" for 1876-7.

### Bideford District (Phtisis), 1861-70.

<table>
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<tr>
<th>Parish</th>
<th>Mean Population</th>
<th>Mean Pop. Persons</th>
<th>Deaths in 10 years</th>
<th>Mean Death Rate of 10 years</th>
<th>Acres per Person</th>
<th>Geology</th>
<th>Mean Death Rate per 1000 per annum</th>
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The deaths are from Mr. Braund's returns.

The seaboard region has a less death-rate than that of the inland parishes; the inland parishes have a less death-rate than those of the adjoining district of Holsworthy. Dr. Thompson, of Bideford, says, "The soil in the Holsworthy district is wet relatively to Bideford."
The deaths are from Mr. Windeatt's returns.

The chief fact deductible from the returns of death from Phthisis in Devon during the ten years 1861-70, is that Phthisis exists least where the inhabitants habitually live very much an out-of-door life; e.g. Western Dartmoor (excluding Prisons), 0.37; North Devon, Exmoor region (excluding Ilfracombe), 0.45; against England and Wales, 2.47.
A CATALOGUE OF THE
GEOMETRINA OF PLYMOUTH AND ITS VICINITY.

ARRANGED ACCORDING TO STAINTON’S MANUAL.

BY MR. G. C. BIGNELL.

Order: Lepidoptera—Lin.  
Section: Heterocera—Bdv.
Group: Geometrina—Stal.


**EPIONE apiciaria.** Rare. July and August. Near the Stonehouse reservoir.

**RUMIA crataegata.** Abundant. April to October. Lanes and hedge-rows.

**VENILIA maculata.** Very common. May and June. Lanes and hedge-rows.

**ANGERONA prunaria.** Common. June and July. In and near woods.


**PERICALLIA syringaria.** Rare. July. Near Cann Quarry.

**SELENIA illustraria.** Common. April and July. Lanes and hedge-rows.


**ODONTOPERA bidentata.** Common. May. Bladderly Lane, Cann Wood, Bickleigh, Radford.

**CROCALLIS elinguaria.** Common. July and August. Lanes around Cann Wood, Bladderly Lane, Compton.


*angularia*. Common. August and September. Lanes; a visitor to gas-lamps.


Biston *hirtaria*. Rare. April and May. Cann Wood.


Hemerophila *abruptaria*. Rare. May and August. Stoke.


I have many times bred the beautiful banded variety (*conversaria*) from larvae found feeding on *Erica cinerea* (Heath).


*roboraria*. Rare. June and July. Once in Cann Wood.


Gnophos *obscurata*. Common. July and August. Hedge-banks around Stoke, Whitsand Cliffs. Imago plentiful (July 10). Larva to be found only at night.


trilinearia. Rare. May and August. Bickleigh.

omicronaria. Does not occur in the vicinity of Plymouth. I have taken it at Exeter and Teignmouth, where its food-plant (Maple) grows abundantly. May and August.


rusticata. Rare. July. Eastern Cliff, Rame Head.

interjectaria. Common. June. Cann Wood, Laira Embankment. There has been some little confusion between osseata and interjectaria. A. osseata is described in "Stain. Man.," ii. 46, as having the costa brownish.

Mr. H. Doubleday, in a communication to "The Entomologist," vol. iv. 30, says, "I have recently received from Dr. Standinger several specimens of the true Acidalia osseata. I had not seen a Continental specimen before. The typical examples have a bright red costa, and I have never seen any British specimens like them; but I possess five or six which appear to be identical with a pale variety, also sent to me by Dr. Standinger. There is however no doubt that the majority of specimens in our cabinets under the name of osseata are really interjectaria. Haworth's description of the former species applies to the latter."

The only difference between osseata and interjectaria is the colour of the costa; the former is "bright red," the latter "brownish." Stainton's description of osseata applies to interjectaria.


emarginata. June and July. Plymouth, “Stain. Man.” I have taken it at Exeter and Shaldon, but not in this locality.


\textit{exanthemaria}. Common. May and June. Same as the preceding.


taminata. Rare. May and June. Eastern end of Chelson Meadow.

\textit{Macaria alternata}. Not rare. June and July. Road to Shaugh from Plympton, and from Egg Buckland to Plymbridge.

\textit{notata}. Not rare. May and June. Compton, Bickleigh.

\textit{liturata}. Common, but local. May, June, and July. Cann Wood, among the fir trees.


\textit{Fidonia atomaria}. Not common. May and June. Ivybridge, and on the Downs among heath.

\textit{Sterhra sacraria}. Rare. May, July, August, September, and October. The first recorded capture in England of this beautiful little moth is in the “Weekly Intelligencer,”
vol. iii., p. 36, taken by Mr. H. Rogers, "at a gas-lamp," near Sea View Terrace, Plymouth, on the 28th of September, 1857. I have had the pleasure of taking two; the first on the 6th of September, 1865, at Mount Batten, the second, October, 1867, out of a gas-lamp in Richmond Walk, Devonport.


aurantiaria. Common. October and November. Same as preceding.

progemmaria. Common. February and March. Same as leucophearia.


Cheimatobia brumata. Abundant. October, November, and December. Everywhere. This is one of our most destructive insects, the ubiquitous larva feeding on all trees.


alchemillata. Rare. May and June (22nd June). Near Maker Church, Plymbridge.

albulata. Common. June. Ivybridge, first field after passing through the woods in the vale.

**Eupithecia venosata.** Not common. May and June. Railway cuttings and embankments, and on the coast. I have never captured the imago at large, but have bred many from larvae obtained in seed capsules of *Silene inflata*. The larvae of this genus are found more frequently than the imago, the majority of them feeding on flowers and seed.

**linariata.** Not rare. June and July. Laira. Larvae in seed capsules of *Linaria vulgaris* (Yellow Snapdragon).

**pulchellata.** Common. May, June, and September. Where *Digitalis purpurea* (Foxglove) is abundant, larvae feeding in the flower, on the pistil and stamens.

**centaureata.** Common. June and July. Quarry, Richmond Walk; Stoke; Cawsand; Bovisand. Larvae on flowers of various umbelliferae.

**castigata.** Common. May and June. Bickleigh, Shaugh, Wembury.

**irriguata.** Rare. April. Boringdon Wood.

**trisignata.** Not common. June and July. Bickleigh Vale. Larvae feeding on the flowers and seed of *Angelica sylvestris*.

**albipunctata.** Common (in the larva state, on blossoms of *Angelica sylvestris*). May and June. Bickleigh Vale, Plymbridge, Antony, Billacombe.

**nanata.** Not common. May, June, and August. Homerdown, Brixton Brake.

**vulgata.** Rare near Plymouth. April, May, and July. Road to Whitsand Bay from Maker.

**absynthiata.** Not rare. June and July. Wembury.

**assimilata.** Common. May and August. Everywhere in gardens, on currant bushes.

**dodoneata.** Rare. April, May, and June. Boringdon Wood.

**abbreviata.** Common. March and April. Bickleigh and Cann Wood.

**exiguata.** Rare. May and June. Ivybridge, Whitsand Bay.

**pumilata.** Rare. April and May, and again in July and August. Lee Moor Tramway, Ivybridge.

**coronata.** Rare. April and May, and again in August. Plymbridge.

debiliata. Rare and local. June. Plymbridge. Larva in
spun-up leaves of Vaccinium myrtillus, after the style of
many Tortrices.

Lobophora viretata. Local and rare. May and June. Larvae
in June on flowers of Viburnum opulus (Guelder rose),
August and September. Larvae in September on flowers
of Hedera Helix (Joy). Cann Wood, near Plymbridge,
Chelson Meadow, and Hooe.

lobulata. Common and local. March and April. Cann
Quarry and Wood.


Ypsipetes impluviata. Common. May. On the road between
Plympton and Plymbridge.


Melandthia rubiginata. Rare. July. Cann Wood, Bickleigh,
Radford.

ocellata. Common. May and June. Plymstock, Bickleigh,
Plymbridge.

Melanippe tristata. Rare in the vicinity of Plymouth. June.
Crabtree, common on Blackdown (between Kingsbridge
Road Station and Kingsbridge).


rivata. Common. July and August. Bickleigh, Hartley,
and almost every wood or damp lane.


montanata. Abundant. May, July, and August. Roads,
lanes, and hedge-rows.

galiata. Very common. May, June, and September. Every-
where out of the town.

fluctuata. Very common. April, May, and August. Every
garden in or out of town.

Anticlea sinuata. Rare. June. Egg Buckland, Plymbridge, near
Bickleigh Bridge.

rubidata. Common. June. Bickleigh, Plympton, Laira,
Whitsands, Bolt Head, Wembury.

badiata. Common. March and April. Bickleigh, Plympton,
Laira.

derivata. Rare. March, April, and May. Mutley, Laira,
Cann Quarry (at sallow bloom).
Coremia propugnata. Local, and not common. May, June, and August. Near Cann Quarry, meadow near Plymbridge.


unidentaria. Rare in Plymouth, at Exeter common. May, June, and August. Bickleigh.


flaviata. Not common. July, September, and October. Stoke, Tothill. In 1857 this insect was quite common at gas-lamps in the suburbs.


miata. Rare. September to May. One at a gas-lamp North Road, near Tavistock Road.


Chesias spartiata. Local, and not common. September and October. Plymbridge, Marsh Mills.

Tanagra charophyllata. Rare near Plymouth, common at Bolt Head. June and July. Horrabridge, Cann Wood.

This list comprises all the Geometridæ that I can ascertain to have been taken in the vicinity of Plymouth. The number of Geometridæ occurring in Great Britain (Newman's "British Moths," 1869) amounts to 276, 147 of which have been taken in this locality.

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BAILLON'S CRAKE. CREX BAILLONII.

An immature specimen of this our smallest Gallinule (although the Olivaceous Gallinule, G. minuta, is thus wrongly named Minuta) was obtained last week in the marsh lying near the Marazion Railway Station. I have noted two from this neighbourhood before, and they were fine adult specimens, with the full lead-blue colour on the under parts which characterizes the adult bird both in this and the Little Gallinule, so-called. This colour is entirely absent in the specimen now under notice, the prevailing tone of colour being a dull ash-brown, with striated lines and markings. I observed the irides in this young bird were bright yellow; in the adult bird the colour is vermilion. Weight, just over one ounce.

Penzance, Oct. 13th, 1877.

E. H. Rodd.
OBITUARY NOTICES.

ROBERT WERE FOX, F.R.S.

In the late Robert Were Fox, F.R.S., the Institution has lost one of its oldest and most esteemed honorary members, a man who for more than three-score years had been devoted to scientific research, and who had pioneered the way in some of the most difficult and abstruse enquiries connected with electricity and mineralogy, and other practical and experimental sciences.

Born on the 26th of April, 1789, at Falmouth, he continued to reside there, or in its neighbourhood, until his death, in his eighty-ninth year, in June, 1877. He was educated at home in the classics and mathematics, and in some foreign languages. Excluded at that time from the Universities, where, too, physical science was then much neglected, his advance in it would have been slow if he had not had in the varied scenes around him, on the ocean and land, and in the depths of both, ever fresh objects for enquiry, and for experimental researches on the cosmic forces—gravitation, light, heat, electricity, magnetism, and chemistry. He seems to have owed his first impulse in a scientific direction to his mother, who directed his attention to the investigation of the properties of steam. One of the earliest subjects of his enquiry was therefore the important point of the limit of the advantages of high-pressure steam. In company with Mr. Joel Lean, he made a series of costly experiments, so early as 1812, which proved that the advantage of high-pressure steam was mechanical rather than chemical, the heat and water contained in a given ratio of steam increasing nearly in the ratio of its elasticity; and in the same year, in conjunction with Mr. Lean, he took out a patent for improvements in steam engines. Three years later he commenced the enquiry which was to establish his reputation throughout Europe; and which was to bring up evidence *de profundis,* "that mother earth retained in her bosom warmth more genial than volcanic fire, and an electro-magnetic *vis insita,* which plays amidst the strata, and amidst the flashes of the aurora, and is doubtless connected with the crystallization and arrangement of her minerals."
His family being more largely interested in the mines of Cornwall than any other at that time, minerals, with their composition, crystallization, and their deposition in veins, naturally engaged his attention. In 1815 he and his friend Mr. Joel Lean requested Captain Thomas Lean to ascertain the temperature in the bottom of Crenver mine; he also furnished Captain Rule with thermometers to make similar observations in Dolcoath. The "Transactions" of the Geological Society of Cornwall of 1819, 1820, and 1822 record some of the results, showing the gradual increase of temperature in depth. This was contested at home and abroad, or attributed to the presence of miners and their candles, which Humboldt at first did in the Mexican mines, while afterwards Humboldt had great difficulty in persuading Arago even to allude in the "Annales De Chimie" to Mr. Fox's researches. His conclusions as to the ratio of increase of heat in depth have been more or less confirmed, however, by subsequent observers in different parts of Europe, and at greater depths.

"The mean result from his table of observations, showing an increase of 5° Fahrenheit for a depth of 300 feet, or 1° Fahrenheit for 60 feet, is so near to what may be taken as the average given by many observers in different parts of the world, as to impress one with the importance of such a contribution to science, at a time when not only had 'public opinion' a great objection to these views, but certain insufficiently practised experts joined in denying them." Mr. Fox in his first essays on this important subject was singularly modest and tentative in its treatment. He suggested merely that the warmth of mines did not appear to have received the attention it deserved; and without entering into speculation on the exciting cause, or the extent of the internal heat, suggested the probability that "the ascent of warm vapour may produce the high temperature in mines; and that its effect is more or less considerable in proportion to the facility with which it finds a passage upwards." Here then, in addition to the enunciation of the general principle, the variations and anomalies which attend its manifestation were at once accounted for. By no one was Mr. Fox more ably supported in his argument than by our late distinguished member Mr. W. Jory Henwood, F.R.S., who brought an immense mass of exact observations to bear upon the point, which it was impossible to gainsay. And it is now beyond question that to Mr. Fox was thus due the first discovery and statement of
the great law of the progressive increase of the temperature of the earth in depth.

These enquiries led Mr. Fox to take up further investigations into the then utterly unexplored region of terrestrial electricity and magnetism. He had speculated that in the earth there are the conditions of a voltaic pile, giving rise to electric currents; and he proved this by descending into some of the deepest mines, where he had the pleasure of seeing the needle of the galvanometer deflected when wires connected it with different parts of a vein. In June, 1830, Mr. Fox's paper on the electro-magnetic currents in metalliferous veins was read before the Cornwall Geological Society. He stated that the temperature of the earth must at considerable depths produce greatly superheated steam, and sometimes occasion earthquakes. It might also convey minerals in solution to be deposited by electric currents in fissures (whether enlarged from time to time, as many have been, or not), but mainly in those which ran more or less at a right angle to the magnetic meridian of the period. His formation by electrical action of mineral veins in clay illustrated and confirmed his views.

When M. Ampère inferred that the direction of the terrestrial magnetic meridian is due to electrical currents circulating from east to west, Mr. Fox argued that such currents would tend to course through east and west fissures, in which saline solutions were present, and that in the decomposition which would thence result the metals or bases would be determined towards the electro-negative contiguous rocks, and the acids to the electro-positive.

He was not only in this way the discoverer of the electricity of mineral veins, but the inventor of the deflector dipping needle, by which he determined the magnetic dip and intensity in various places in England and on the Continent; and his last public work was the final adjustment by his own hands of the dipping needles for the Arctic expedition under Sir George Nares.

Steinheil, in 1838, observed that, with one wire only, the electric circuit was completed through the earth. About the same time Mr. Fox independently discovered this fact, of the greatest importance in telegraphy, whilst experimenting with the electric wire of his young friend, the late Mr. R. Barclay, jun., at Leystonstone, and communicated the fact to Professor Wheatstone. Space does not admit of further reference to his various papers in the "Transactions" of the Royal, Polytechnic, London, and Cornwall
Geological Societies. The list of his publications is long; they amounted to nearly sixty, and many of them have been translated into foreign languages.

"Mr. Fox was particularly notable as a mineralogist; not one who contemplated a mineral as a dry and dead subject of chemical or geometrical disquisition, but who took it as a centre of various interests, coupled with questions of physics, of statistics, of geography, and even of personal character. Nowhere do I recollect to have passed more charming hours than in hearing his elucidations of a drawer or two of mineral specimens from his choice little cabinet at Penjerrick." *

Mr. Fox was the last survivor of the original founders, in 1814, of the Royal Geological Society of Cornwall, the first provincial association devoted to the advancement of geological knowledge. He was also one of the founders of the Royal Cornwall Polytechnic Society; and at the time of his death was one of the oldest fellows of the Royal Society. He was one of the local secretaries of the British Association when that learned body paid its first visit to Plymouth, in 1841.

In 1814 Mr. Fox married Maria, fourth daughter of Robert Barclay, of Bury Hill, and with her visited France, then just opened after the long war to English visitors, and made acquaintance with some of its most distinguished men. An economist of time, his scientific pursuits were not allowed to interfere with his duties towards his family and his fellows. A British School had his constant support and frequent personal attention for nearly seventy years; and he was an office-bearer of the British and Foreign Bible Society for more than sixty years. The consulship for the United States, to which post General Washington had appointed his father for the West of England, his mercantile concerns, and the fatherly care of the poor, for whom he acted as guardian for a long period, also claimed his attention.

When a boy he wrote an essay on Liberty, a theme given to him by his mother. The lad's early opinions became the matured convictions of the man. In 1825 he wrote in the "Times" in favour of relieving Roman Catholics from the legal disabilities imposed on them. In 1852 he went to Lisbon to present to the Queen of Portugal an address from the Society on the subject of slavery. He was accompanied by the late John Candler, who visited Brazil.

* Professor Warington Smyth, F.R.S.
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the West Indies, and the United States, on behalf of the slaves. He united with fifteen other gentlemen of different nations, deputed in 1863 to plead with the Queen of Spain, at Madrid, for the liberation of Matamoras and others, imprisoned as Protestants.

His great affliction at the death, in Egypt, of his only son, R. Barclay Fox, in 1855, in the flower of his age, and in a highly useful career; of his wife, in 1858, after a happy union of forty-four years; of his daughter-in-law, in 1860; and of his youngest child, Caroline, in 1871, was borne in a Christian, unmurmuring submission to the Divine will. Neither commercial nor philanthropic engagements, no scientific pursuits or social pleasures, were allowed to interfere with the regular attendance at the religious meetings of the Society of Friends, of which he was a member. Rising early, being much in the open air, with habitual temperance in diet, he enjoyed great vigour of body through a long life (until his last illness, the effects of an accident), of which the latter years were spent at Penjerrick. Thence he looked down the wooded valley on the expanse of sea, on which his grandfather ("a man of Christian principles, and most engaging gentleness") had seen, and from the same terrace, the fleets of France and Spain, combined for invasion, and heard the warning strains of their bands.

R. N. W.

MAJOR-GENERAL NELSON, R.E.

MAJOR-GENERAL NELSON, R.E., who died in July, 1877, at the age of seventy-four, had been for many years a corresponding member of this Institution, although he had not for some time taken an active part in its affairs. Not long before his death, however, he showed his continued interest in its proceedings by exhibiting his portfolio of scientific drawings to the members, previous to presenting these valuable records of his early scientific studies to the Linnean Society. Major-General Nelson was a native of Devonport, then and long after his birth known as Plymouth Dock. His father was a general in the army who had held command and settled in that town; and he at an early age entered the Royal Engineers, which had not then developed into the distinguished scientific corps which it has since become. The first foreign station of the young lieutenant was Bermuda, and here he occupied his leisure with making observations on the character and growth of
coral reefs, for which these islands afford singular facilities. It is not too much to say that to these early investigations of General Nelson the scientific world was indebted for the first true conception of the nature of coral growth, until his time utterly misconceived. The result of his labours the young officer embodied in a series of papers, communicated to the Geological Society of London in the years 1830–33, under the title, "Observations on the Geology of the Bahamas;" and they appeared in the "Transactions" of the Geological Society for 1837. Of their high value testimony was borne by the most competent authority, Dr. Duncan, F.R.S., in his recent address as president to the fellows of the Geological Society, in the course of which he said: "Of all the careful research that has influenced the palaeontology of late years, none is equal in importance to that which has partly settled the question regarding the morphological value of tabule in corals. Louis Agassiz described Hydractinian-looking polyps on millepora, a tabulate coral; and General Nelson (the Lieutenant Nelson whose classical description of the "Geology of Bermuda" has had such a good influence on our science) made drawings of similar organisms, and investigated the peculiar tabular character of the corallum."

General Nelson had long ceased to take any active part in the prosecution of scientific enquiry. Professional duties, as they increased with rising rank, left little opportunity for rearing the superstructure of the building, the foundations of which he had laid so well; and when he retired from active service he chiefly concerned himself with efforts of a philanthropic and religious character. He died, after a short illness, at his residence at Stoke.
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