

## REFERENCES

- 1 *Phil. Trans. Royal Society* (1725), 33 and (1729) 36.
- 2 *Phil. Trans. Royal Society* (1754), 48.
- 3 Taylor, E. G. R. (1955). Biography of H. Saumarez in *The Mathematical Practitioners of Tudor and Stuart England*.

*Lieutenant-Commander Waters writes:*

I am grateful to Mr. Robinson for clarifying the principle of Saumarez's patent log and for his lively account of the abortive attempts to get the log to work.

H. R. Spencer, 'Sir Isaac Newton on Saumarez Patent Log', *American Neptune*, 14, 214, (1954), did not describe the principle upon which this log was based but quoted Sir Isaac Newton as reporting that he was

'of the opinion that by means of the Instrument . . . a Reckoning of the distance sailed by a Ship may be kept with less trouble than by the Logg-Line, but I am not yet satisfied that the Reckoning will be so exact . . . The instrument now proposed will keep a Reckoning of the Motion of the Ship with respect to the upper part of the Sea Water, but not of the driving of the Ship by Currents and Tides, and by the Motion of the upper surface of the sea caused by winds, and how far it will keep true Reckoning of the Motion of a Ship side Ways, occasioned by side Wind, doth not appear to me, and therefore the Logg-line is not to be laid aside until further experiments have been made.

J. B. Hewson, *A History of the Practice of Navigation*, (1954, pp. 166–7) states that both Foxon's and Russell's perpetual logs, tested by Captain Phipps in 1773 and reported upon favourably by him, 'were constructed upon the principle that a spiral in moving its own length in the direction of its axis, through a resisting medium, makes one revolution about its axis', and that the construction of Saumarez's *Marine Surveyor* 'was somewhat similar'.

As he also states that the *Marine Surveyor* was mentioned 'by a well-known writer, in a book on navigation as being in existence at this time' [1773 when, he states, Russell's and Foxon's perpetual logs were successfully tested] I erroneously concluded both that Saumarez's log was in principle similar to Russell's and Foxon's and that the tests on it recommended by Sir Isaac Newton had subsequently been passed successfully. My footnote referring to Saumarez's log was therefore misleading. The correction is both timely and valuable.

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## A New History of Navigation

*from P. Collinder*

PROFESSOR E. G. R. TAYLOR's review, in the April 1955 issue of this *Journal*, of my book *A History of Marine Navigation* has passed unnoticed by me during a long absence, and I beg leave to offer a few comments.

The reviewer's introductory remark is indisputably correct; the title is not an adequate one. The Swedish title, literally translated, is *From Noah's Dove to*

*the Gyro-compass: navigational art, ancient and modern.* In the earlier chapters I have not followed a chronological sequence but rather proceeded in order of the degree of complication of the methods used. In the later part of the book, I admit that there are many *lacunae*. However, as the reader will find, there was no 'final jump' to electronic navigation; there were several stepping-stones, viz. wind- and current-charts, the gyro-compass, radio-location, and echo-sounding.

I was also aware that my chapter on Radar, Decca, Loran, and Consol, was rather short; but these are new and frequently described subjects, and lectures given to different audiences had seemed to me to indicate that it ought to be enough for ship-minded readers. Anyhow, the reviewer's quotation of the passage denounced as especially short gives only about one-sixth of my paragraph on Consol.

There are some points of Prof. Taylor's criticism that cannot be identified and that are thus beyond comment. The 'unauthentic death-bed scene of Sebastian Cabot' is an error of mine; the act of secrecy was between the younger Cabot and his successors, and this seems to leave my argument still valid regarding the secretiveness of ancient navigators<sup>1</sup>.

I am aware that my 'explanations on the origin and use of navigational instruments' may be 'faulty or at least inadequate'. The only instance explicitly referred to by the reviewer is that on Harrison's chronometers, which is denounced as absurd. I have followed, among others, Dr. Ward of the South Kensington Museum<sup>2</sup> who speaks of 'much delay and friction between the Board and Harrison'. I find likewise that Professor Guyot, the Swiss authority on time measurement and geographical positions, states<sup>3</sup> that the Longitude Board tried to bind Harrison to new conditions which were not in the original Act of 1714. Of the reviewer's two quotations on Harrison's chronometers, the first was stated by me to apply to the first model, the pendulum clock (as it is called even in the *Encyclopaedia Britannica*, 1953). The second statement quoted was made by me only after saying that Harrison made 'model after model, &c'. I cannot find how the second passage can be taken to apply to the first model.

As regards the voyage of St. Paul, I have not given a 'reconstruction' but a 'precis', as it is called in the book, of the naked facts of navigation, which nobody can pass by in this connection. Among these facts I have not counted the supposed ship's council, in which, if the Apostle was included, he may have been so not perhaps, as a political prisoner but more probably as a free Roman citizen. Here Professor Taylor offers an interesting conjecture (the ship's council)—a method which, however, she disputes my right of using in other contexts.

The precessional effect on the position of the Pole Star has been known to me for half a century, and my book quotes Callimachus speaking, not of the Pole Star but of the Little Bear as the steering-mark of the Phoenicians. These may, some centuries before Thales, have taken as their steering-mark a point half-way between the stars  $\beta$  Ursae minoris and  $\kappa$  Draconis, but I have refrained from such a refinement in an elementary exposition.

When the reviewer states that two of the chapters are added 'for good measure' I cannot find this supported by facts. Thus the Red Sea chapter was designed from the beginning to illustrate how, while methods are changing, the great problems are but slightly changed, and so is life with the elements. If Professor Taylor's other allusion implies that a sketch of the life of Maury, the founder of

nautical meteorology and the perfecter of sailing-ship navigation, is out of place in such an elementary book, I must be allowed to differ.

If the inadequacy of the English title be conceded, the book may perhaps be judged as a pardonable endeavour in a difficult field. As in some other branches of science and of the arts, it appears evident that a complete and authentic history of the art of navigation cannot be written before the completion of a long series of special investigations such as are published from time to time by the reviewer and a few others. In spite of the harsh and partly just criticism it is perhaps not too bold to hope that even a deficient essay based on thirty years of practical and theoretical work in navigation and the history of astronomy may serve a purpose in keeping public interest alive, while waiting for a better book on an ancient and venerable theme.

#### REFERENCES

- 1 Taylor, E. G. R. (1928). *Geogr. J.* 72, 333.
- 2 Ward, F. A. B. (1947). *Time Measurement*, 1, 38.
- 3 Guyot, E. (1955). *Histoire de la Détermination des Longitudes*, p. 100 and seq.

#### *Professor Taylor writes :*

Dr. Per Collinder's publishers did him ill-service by mis-translating his title, and so leading me to review his book severely as a formal 'History'. Old Cabot's secret which he failed to sell was the fallacy that longitude could be determined by the magnetic variation. As to Harrison, there will always be conflict between those who judge with a warm heart (like George III) and those who use a hard head, as Maskelyne was bound to do. I agree that it is difficult to make clear in a few words the sequence of models between the pendulum clocks and the large watch which passed the final tests. And as to Maury and the Red Sea pilot, my criticisms are irrelevant to a book written in the spirit and with the purpose that the author explains.