



A WEEKLY ILLUSTRATED JOURNAL OF SCIENCE

*"To the solid ground
Of Nature trusts the mind which builds for aye."*—WORDSWORTH

THURSDAY, MAY 4, 1882

TONNAGE LEGISLATION

WHEN it was announced, towards the close of the year 1880, that a Royal Commission had been appointed to consider the operation of the Tonnage Law, the action taken by the Government occasioned no surprise amongst persons interested in shipping. Disputes and differences of opinion, between the officials of the Board of Trade on the one side, and shipbuilders or shipowners on the other, had been growing more and more frequent in recent years; the rapid development of shipbuilding and the introduction of new types of ships or new systems of construction making difficult the application of the Law of 1854. When that Law was passed its language was clear and unmistakable, strictly applying to the ships then built. Wood still held the first place as the material for construction, and the technical terms used by Moorsom bore special reference to wood ships, although they were not inapplicable to the existing iron ships. Ships were then of moderate size and simple construction; ocean steam-navigation was comparatively in its infancy; and the marvellous growth in dimensions, speeds, and diversity of type which has taken place in the last quarter of a century could not have been foreseen—much less provided for in framing the Tonnage Law. It will readily be seen, therefore, that controversies of opinion were unavoidable when the Act of 1854 had to be extended to modern steamships, every clause being subjected to the closest scrutiny, and a strict legal interpretation being given to phrases which were originally clear enough, but of which the modern readings were doubtful or obscure. Shipowners naturally desired to secure the minimum nominal tonnage for their ships, since dues and taxes were assessed thereon; the Board of Trade surveyors, on the other hand, while acting with perfect fairness, might be expected to adopt an interpretation of the law which tended towards a tonnage exceeding that admitted by the owner. In some notable instances of recent occurrence the Board of Trade has either had to yield to these claims for reduced tonnage-measurement, or has been beaten in an appeal to the Law Courts; and

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it was natural, under these circumstances, that an attempt should be made to secure such an amendment of the Act of 1854 as was needed to prevent further controversy.

Nor was this the only reason for revision. Ever since the present tonnage law has been in force for British ships there has been a tendency on the part of other maritime nations to approximate to our system of measurement. The International arrangements made in connection with the Danube navigation and the Suez Canal have been based on the Moorsom system; and at the present time there is a closer approach to a uniform system of tonnage than has ever been reached before. This desirable result has been produced to a large extent by the action of the Board of Trade, whose successive Acts for the Amendment of the Law of 1854 have been adopted in foreign countries, although they have failed to secure Parliamentary approval at home. Consequently we stand, at present, in the curious position of still having in force the earliest and confessedly imperfect edition of the Moorsom system, whereas English experience and suggestion have given to other countries amended editions. On this ground, therefore, it was desirable to revise the tonnage law, even if the system remained unchanged in principle.

Further reasons for revision of a more thorough and sweeping kind were not wanting. It was admitted that the Law of 1854 was a great improvement upon its predecessors: more scientific in its mode of measurement, and having a sounder basis as applied to the ships built when it was framed, and to the then existing conditions of trade. On the other hand, it was alleged that subsequent changes in trade and shipping rendered the operation of the Tonnage Law injurious, hampering the skill of the shipbuilder, fostering certain inferior types of ships, and favouring heavy loading. In short, it was asserted that a change of system was needed on the grounds of greater safety to life and property, and greater fairness and freedom as between different types of ships.

All these reasons for inquiry are recognised in the Instructions issued to the Royal Commission. No one can fairly complain that the field of investigation is unduly limited; and a perusal of the evidence taken by, or the documents submitted to the Commission, will show that the exponents of every shade of opinion had the greatest

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freedom allowed them in illustrating their views. If no other purpose had been served, the inquiry would have been justified by the very valuable summary of facts and opinions which it has been the means of putting on record. All that it is necessary to read for the full understanding of the past history of British tonnage laws can be found in the Minutes of Evidence or the Appendices; and much valuable information respecting foreign tonnage laws can also be found therein. Valuable as this feature of the work may be, however, it does not represent the purpose for which the Commission was primarily appointed, and when one turns to that aspect of the subject the results are not nearly so satisfactory.

In *NATURE*, vol. xxv. pp. 585-7, it was stated that the Commission did not make a unanimous Report. Three of its members dissented from the majority, and each of them produced a separate Report. This is not a matter for surprise; in fact it would not have been surprising had the Commission simply followed the precedent of the Parliamentary Committee of 1874, and submitted the evidence without making a Report. The majority consisted of nine gentlemen whose opinions are entitled to the greatest respect, including shipowners, shipbuilders, dock-proprietors, and representatives of the Board of Trade. As explained in vol. xxv. pp. 585-7, they recommend the retention of the principle of the existing law—viz. measurement of internal capacity—but propose certain amendments in detail. Some of these amendments are reasonable enough, but others are of questionable character; it is, however, of greater importance for our present purpose to consider whether the arguments advanced against a change in the principle of measurement are sufficiently weighty to prevent any change. Of all these arguments the most important are those relating to international obligation and convenience. Bearing in mind what was said above respecting the action of this country in leading up to a system of international tonnage, on the basis of internal measurement, it will be seen that an abandonment of that basis ought not to be lightly undertaken. But this fact need not bar the inquiry as to the advantages to be gained by such a change; for obviously the most thorough and exhaustive investigation would be needed, on other grounds, before the change could be made. And if after due investigation British shipowners were convinced that the change was desirable, the evidence which would convince them could scarcely fail to induce foreign maritime nations to follow our lead. The matter might well form the subject of an International Conference before final action was taken; such as was done in 1873 when the Suez Canal Regulations were framed.

Turning to the other side much more forcible arguments can be urged against a continuance of the present system. Moorsom took great pains to explain his reasons for using internal capacity as the basis of tonnage measurement; these may be summed up in the statement that internal capacity was the fairest measure of the possible earnings of most ships. This was probably the case in 1854; but is no longer true. In most ships the limit of freight-earning is now found in their "dead-weight capability"; that is to say, the prevalent cargoes of commerce do not now fill the whole space, when the weight taken on board has reached the limit of draught which

can be accepted with a due regard to the safety of the ships. This is not true of all ships, but of most. Passenger ships, for instance, do not come under this condition; in them space is of the greatest value. Other types of ships, always engaged in carrying light cargoes still come under the condition which in 1854 was thought to be nearly universal. Still these cases are now the minority; and in the majority dead weight capability is the more important condition. This being so it is obviously unfair to assess the tonnage of all ships on the basis of internal capacity. In certain special classes, such as the "awning decked" class, it is alleged that the whole space available can never be filled with cargo; and on these classes the existing law bears heavily, although they are acknowledged to be eminently safe and seaworthy.

On other grounds the retention of internal capacity as the basis for tonnage is to be deprecated. Even with the amendments suggested in the Report of the Majority, there can be no hope that the disputes hitherto so frequent will cease, when a decision has to be arrived at respecting the spaces to be included in or excluded from the gross tonnage; and the deductions to be made therefrom in estimating the register tonnage. The Majority evidently realise this difficulty and attempt to meet it by more precise definitions; but the ingenuity which has been displayed in dealing with the phraseology of the Act of 1854 is not likely to fail in finding loopholes in the barriers now proposed. Nor can it be admitted that some of the proposals of the Majority are fair or foreseeing, having regard to the obvious tendencies and the possibilities of progress in shipbuilding and engineering. Into this discussion, however, it is not possible to enter here.

The three dissentient Reports contain much sharper criticism of the Majority Report than appears in the foregoing remarks. Exception has been taken to the tone of these Reports by some members of the Majority, but apparently not with much justice. Mr. Glover represents the shipowners who desire to be "let alone," and think the present Tonnage Law needs little or no change. Mr. Waymouth, accepting the view that "dead-weight capability" now rules the freight-earning of most ships, proposes to make dead-weight capability the basis of tonnage. Mr. Rothery advocates the "displacement," or total weight of the laden ship, as the fairest basis. Respecting Mr. Glover's views nothing need be said additional to what has already been stated respecting the working of the present system; but it is desirable to glance at the other proposals.

Mr. Waymouth has revived the oldest system of tonnage. "Keels" and other coal vessels were so measured time out of mind; and various empirical rules were framed for the "dead-weight capability" of other classes of ships. Being empirical they were easily evaded; Mr. Waymouth favours a well-known system of measurement, which takes account of the true form of the ship and renders evasion impossible. His system demands a fixed load-line; this is one of its difficulties. In order to overcome this objection to his scheme Mr. Waymouth favours the appointment of some central authority by which the load-line will be fixed. It is known that the Board of Trade is now taking preliminary action and ascertaining the

feeling of shipowners on the subject of establishing such a central authority. If it should be formed, then the load-line question might be dealt with more satisfactorily than it has been hitherto, and one difficulty in dead-weight measurement would disappear. But others, and probably fatal ones, would remain; more particularly in dealing with passenger steamers or vessels built to carry light cargoes. In such cases Mr. Waymouth proposes to fix, for tonnage purposes only, a deep load-line; this is not merely objectionable, but would probably be impracticable in many vessels. The dead-weight system has much to recommend it for consideration on the grounds of simplicity and exactness, as well as freedom from the difficulties incidental to internal measurement. But it is not likely to come into use.

Mr. Waymouth, it will be noted, agrees with the majority in proposing to continue the immemorial practice of basing tonnage measurement upon earnings or earning-power. This principle, although long accepted, has always been held open to question, on the ground that the accommodation provided for a ship in harbours, docks, canals, &c., should regulate the dues paid by her, and not her earnings. The "service rendered," and not the earnings, does appear the fairest basis of assessment, and has a considerable weight of authority to support it; but to adopt this basis would clearly necessitate a settlement of the mode of appraising service rendered. Mr. Rothery proposes to take the displacement, or volume of water displaced by a ship to a fixed load-line, as the measure of this service. The load-line, he suggests, might be fixed by the owner or some central authority. To this proposal many objections have been raised; but that which seems to have most force is found in the statement that the volume of water displaced does not measure the accommodation required, since various degrees of fineness of form under water might be associated with the same extreme dimensions—length, breadth, and draught. Two ships agreeing in these dimensions and requiring practically the same accommodation might differ in displacement by as much as 50 to 60 per cent. of the smaller.

Mr. Rothery's proposal has, however, done good in recalling attention to the principle of taxation on *service rendered*. In further investigations this is not likely to be overlooked; and it must be possible to frame some scheme which is not open to the objection to displacement above mentioned. The proposal to take the product of the three extreme dimensions of a ship as a basis for tonnage has been considered, and has much to recommend it, if associated with a fixed load-line. It cannot be said that any of these alternative schemes have received the full consideration they require before being brought forward for adoption. The investigation would necessarily be laborious, and the issues dependent upon it are so important that it should be intrusted only to competent and impartial hands. Certain conclusions are necessarily forced upon every person who makes a study of this subject. First, it is impossible in any revision of tonnage law to ignore the question of the load-line legislation. The majority of the Commission, in their final Report, propose to keep the two questions distinct; but it has been stated publicly by Mr. Waymouth that up to the very last draft Report, the majority made recom-

mendations in the opposite direction; and if this is the case the less weight attaches to the recommendation which actually appears. Second: in considering future legislation, both for tonnage and for load-line, greater regard must be had to the provision of stability for merchant ships than has been had heretofore. Rough "rules of thumb" for free-board, in relation to depth of hold, are out of date. Third: the work to be done must be largely dependent upon the calculations made by competent naval architects for various types of ships, and various conditions of loading. Such calculations applied to vessels which have been thoroughly tested at sea under known conditions of lading must be the foundation for future rules for load-lines. Lastly, it is much to be desired that the proposed Shipping Council should be constituted, and that it should be a central body, including all classes interested in shipping, and having behind it a staff of skilled naval architects. The Marine Department of the Board of Trade has been much abused, and probably unfairly criticised in many cases. Its action, both as regards tonnage legislation and the load-line of ships, may not have been all that could be desired, yet it must be admitted to have been well intentioned. But it cannot be supposed that the Department as now constituted is capable of dealing with the questions pressing for solution. Neither its nautical, technical, nor administrative staff is competent for this task. And it may be supposed that the necessary reinforcement of that staff, the valuable assistance and advice of a Council of Shipping, and the more scientific investigation of matters relating to the safety and good behaviour of merchant ships by naval architects, will be welcomed by the Board of Trade as warmly as by the shipping community. Until these further investigations are completed, amended legislation scarcely seems practicable. It is clearly impossible on the lines laid down in the Report of the majority of the Royal Commission of 1881. W. H. WHITE

MYTH AND SCIENCE

Myth and Science. An Essay. By Tito Vignoli. International Science Series. (London: Kegan Paul, Trench, and Co., 1882.)

THIS work is devoted to a theory of myths and myth-formation, which is to some extent novel. Looking to the general, if not universal, tendency of all races of mankind to create myths, the author contends that the propensity must point to some feature of human psychology of more than a merely superficial character, and without disputing previous theories as to the origin and growth of myths, he seeks to explain the *raison d'être* of the myth-forming faculty. Thus, for instance, he says:—

"The worship of the dead is undoubtedly one of the most abundant sources of myth, and Spencer, with his profound knowledge and keen discernment, was able to discuss the hypothesis as it deserves. . . . Yet even if the truth of his doctrine should be in great measure proved, the question must still be asked how it happens that man vivifies and personifies his own image in duplicate, or else the apparitions of dreams or their reflections, and the echoes of nature, and ultimately the spirits of the dead."

And, speaking of Tylor, he adds:—

"He admits that there are in mankind various normal