CONSTRUCTION of an observatory to house a 5-inch equatorial telescope, recently secured by the Panama Canal from the United States Navy, is in progress. The building is being erected on a small hill a short distance to the northwest of the Miraflores filtration plant, and will be a circular structure 14 feet in diameter, with 6-inch concrete wall. It will be topped with a mobile steel dome equipped to travel on a circular track, permitting the use of the telescope toward all points of the compass and facilitating the observation of celestial bodies in all parts of the heavens. The observatory is being established through the efforts of the Canal Zone Astronomical Society, with the assistance of the canal administration, and is to be used for the instruction of students of the Canal Zone high schools and for Panama Canal employees interested in or associated with astronomical societies. Ground was broken for the building on April 11, and it was expected that the work would be completed in June. The position of the center point of the pier on which the telescope will rest is: Latitude 9° 00′ 15″ North; longitude, 79° 35′ 51″ West.

THE European producers of mercury, desiring new uses for the metal, have offered a prize under the following stipulations: (1) A prize will be awarded, under the conditions below, to whoever proves to a commission of the European producers to have found a new use for mercury or its salts, and to have industrially exploited it, the extent of the use being defined as in (3) below. (2) The use should be as yet unknown to the industry, and should be regularly and definitely protected by patent not before January 1, 1930, in Germany and the United States. (3) The application must be important enough to indicate a new consumption of mercury of at least 1,000 flasks during 1930, 3,000 in 1934 and 5,000 in 1935. (4) The prize will be awarded by a commission consisting of the president and vice-president of the European producers and two technicians named by the Spanish Academy of Sciences and the Academy of Italy, or their representatives. The prize will be £5,000 sterling, £1,000 to be paid immediately upon the decision of the commission; £2,000 one year after the condition in (3) above has been confirmed, and £2,000 two years after the condition in (3) has been confirmed and the consumption of the metal estimated practically and confirmed by the commission. (5) The commission may delay the award, reduce its value or prolong the period of offer without giving any reason for its action. (6) The decision of the commission is final without notification of reasons. (7) The complete account of the studies and practical experiments relating to the new application should be presented in quadruplicate, printed or typewritten either in Spanish, Italian, German, English or French, and should be sent, registered, to Mercurio Europeo, Bureau de Repartition, Plaza St., Francois 5, Lausanne, from which further information may be obtained.

TWELVE National Radium Centers have been nominated by the British Radium Commission, as being places where there are medical schools with complete clinical courses and where treatment of patients can be combined with the education in approved methods of radium therapy. The centers are: *England*—Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle and Sheffield; *Scotland*—Aberdeen, Dundee, Edinburgh and Glasgow; *Wales*—Cardiff. Loans of radium are being restricted in each area to one hospital selected by the medical faculty of the local university. London has been treated as a separate and special problem, and steps have been taken to organize two centers to carry out special work of general and national importance. Approximately 17 grams of radium out of a possible total of about 22 have been ordered and provisionally allocated by the commission to national centers. Of this quantity, nine grams have already been received from the manufacturers, and, after being tested at the National Physical Laboratory, 6¼ have been delivered to centers and a further 3½ will be going out very shortly. In collaboration with the Medical Research Council and the British Empire Cancer Campaign, a set of "Radium National Forms" for the use of recognized centers has been prepared, in order that the clinical records of all cases treated may be kept on a uniform basis and eventually incorporated in general national statistics.

# DISCUSSION

## SEA-LEVEL CHANGE NEAR NEW YORK

UNDER the above title Professors A. C. Lane and W. F. Cheney, Jr., in the March 21 issue of SCIENCE call attention to what they term "an erroneous statement" in *Bulletin* of the National Research Council Number 70 entitled "Studies of Mean Sea-level." The wording of their criticism might lead the reader to infer an error in computation which affected the validity of a certain conclusion set forth in that bulletin, namely, that tidal observations at Fort Hamilton, New York, indicate no appreciable change in sea-level during the last thirty-five years. Those familiar with the bulletin in question will appreciate that Lane and Cheney disagree rather with the conclusion itself. Accepting the figures given there, they proceed to deduce mathematically a probable rise of sea-level of 0.0047 feet a year ± 0.06, or as they otherwise state it, a probable rise of about 0.6 feet

per century. This they consider an "appreciable" change. The comments of Lane and Cheney are pertinent from two points of view.

In the first place, the wording of the bulletin while correct is not as precise as it should be, since it is open to the interpretation that the studies there described do definitely indicate some progressive change in mean sea-level, but that the author of the bulletin did not consider such change appreciable. The text of the bulletin should have stated more clearly that the tidal observations give absolutely no proof of any progressive change whatever in the relative levels of land and sea in the last thirty-five years; and further, that if any slight change has occurred it must have been inappreciable, since it is so effectively masked by much larger temporary irregular and periodic changes in sea-level (due to meteorological and other causes) as to be incapable of demonstration.

In the second place, it is of course pertinent to challenge the fundamental conclusion itself, as correctly worded in the foregoing sentence. This Lane and Cheney have in effect done. The reader should remember that both in the communication of these authors and in the text to which they refer, the expression "appreciable change in sea-level" is really a short-cut for the phrase "progressive, cumulative change in sea-level continuing over a significant period of time and measurable in terms of inches or feet per century." This is clear from the context in both cases; and indeed the existence or non-existence of such a progressive change is the only point at issue. All agree that there are short-time fluctuations of sea-level, both irregular and periodic, which render difficult the determination of slow progressive changes of level in a given direction for long periods of time.

With the mathematical calculations of Lane and Cheney the present writer would find no fault, but he can not accept their conclusion that the figures indicate a progressive rise of sea-level. It was clearly foreseen that the tidal data set forth in the bulletin were mathematically capable of interpretation as an indication of rising sea-level, and both this fact and the objections to such an interpretation were set forth with some fulness. On this point the present writer can not do better than quote extracts from pages 37 and 38 of the document[1] in question, retaining reference to figures and tables in the bulletin for sake of clarity in the text as quoted:

> Casual inspection of the curve showing the average mean sea-level for each year of this period might lead one to conclude that there has been a progressive rise of mean sea-level or a progressive subsidence of the land at this point. Thus the yearly mean sea-level repeatedly sank below the datum plane to which these readings are referred (supposed mean sea-level at Sandy Hook) during the years 1893–1913; but it has never fallen that low since 1913. Again, as shown in Table 9, the average position of mean sea-level for the first five years of this period is lower than for any subsequent five-year period.
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> But the curve shown in Fig. 14 and the data tabulated in Table 9 must be interpreted in the light of our present knowledge of the marked fluctuations to which mean sea-level is subject owing to astronomical, meteorological and other conditions. The curve itself is sufficient evidence that mean sea-level varies greatly from year to year, and indicates that these variations are apparently highly irregular and unsystematic. The work of W. Bell Dawson and H. A. Marmer has shown that there are periodic variations in mean sea-level, and that if we average the records for a number of years so as to eliminate the discordant effects of great annual variations, there will appear some evidence of a four-year period, and also of a nine-year period. Thus the average position of sea-level at a given point during one complete four-year period may differ from that of another four-year period by as much as two inches, even when no real change in the general elevation of land or sea is taking place. Similarly the nine-year period may cause fictitious appearance of progressive emergence or submergence amounting to an inch or more. When we have available accurate tidal records extending over very long stretches of time, we may discover that there are other and longer periodic fluctuations of sea-level due to astronomical and meteorological causes.
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> When we examine the curve of Fig. 14 and the data tabulated in Table 9, with the known fluctuations of mean sea-level in mind, we see that they afford no proof of any progressive change in the general level of land or sea. The annual variations, the four-year variations and the nine-year variations shown by the curve are all within the limits of variations normally due to astronomical and meteorological causes. The more or less steady rise of sea-level from 1912 to 1919 was followed by a more or less steady fall from 1919 to 1926. As shown in Table 9, the average position of mean sea-level for the first five years of the thirty-year period 1898–1927 differed from that of the last five years by only 0.01 foot, or little more than one tenth of an inch. Obviously, there is nothing thus far revealed in the Fort Hamilton record which can be taken to indicate a progressive rise of the general sea-level, or a progressive subsidence of the land.

One need only add that in 1925 Marmer wrote: "It may therefore well be that the apparent subsidence of the coast from 1909 to 1919 represents but the rising phase of a fluctuation in sea-level with a period of something like twenty years."[2] The drop

[1] Douglas Johnson, "Studies of Mean Sea-level," *Bull. Nat. Res. Council* No. 70, 50 pp., 1929.

[2] H. A. Marmer, "Sea-level Along the Atlantic Coast of the United States and its Fluctuations," *Geogr. Review*, 15: 438–448, 1925. See p. 447.

of sea-level from 1919 to 1926 referred to above may afford some support for Marmer's twenty-year period, a support not necessarily negatived by the higher level of 1927. Time will give the answer to this phase of the problem, as to others.

Should continued tidal observations at Fort Hamilton demonstrate the reality of a very slow rise of sea-level, thus far masked by the combination of irregular and periodic variations of the ocean surface, we would still be far from the demonstration of a general progressive rise of sea-level or subsidence of the land. Such rise might be but the upward swing of a periodic fluctuation extending over a span of time longer than any yet determined. Accurate tidal records do not go far enough back to enable us to detect a thirty-five-year or longer period. Again, the rise might be both local and temporary, due to changes in the form of shores and channels, as set forth on page 39 of the bulletin previously cited. Comparison with other tidal stations would in time reveal the nature of the rise.

Meanwhile we must recognize the following pertinent facts. (*a*) Although mean sea-level is the best known datum from which to reckon slow progressive changes in the relative levels of land and sea, it is itself an uneven surface. Furthermore, it is an extremely sensitive surface, subject to both irregular and periodic changes in altitude some of which extend over decades. (*b*) Hence the determination of slow progressive mean sea-level changes, far from being the simple operation it was once considered, is a peculiarly delicate and difficult task. (*c*) While precise tidal observations are now available for a period sufficiently long to show the absence, during such period, of any pronounced rate of subsidence, like the one or two feet per century commonly attributed to the Atlantic Coast, the occurrence of a much slower change (what the writer has called an "inappreciable" change) can be neither affirmed nor denied until many more years of precise tidal observations are at our disposal. The writer does not deny the possibility of a slight or slow change, and hopes some one may take sufficient interest in the subject to finance the maintenance of a tidal station in some position suitable for the required critical observations.

With the suggestion of Lane and Cheney that the whole question deserves further consideration we are in hearty accord. Aside from its scientific interest the problem of slow sea-level changes enters into practical affairs where the engineer must foresee increased wave activity on a subsiding coast, where title to submerged property depends on whether the submergence was due to natural or artificial causes and in other circumstances which need not be considered here. Hence every contribution to this difficult problem is doubly welcome. But it is not clear that the further suggestion relating to meanders in streams flowing at and below tide-level is pertinent to the question at issue. Even if such meanders indicate past submergence (which remains to be demonstrated), it is difficult to see how they could throw any light on slow changes in sea-level supposed to be taking place at the present time.

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## ON GENUS AND SPECIES MAKING

PROFESSOR NEEDHAM'S objections to certain lengthy generic names[1] appears to have brought forth a flood of comment, mostly reactionary, not only concerning the length of generic names but also relative to the alleged overmultiplication of generic names.[2] More recently Dr. Hubbs[3] has hastened to the defense of the systematic zoologist. As a systematic zoologist working with the invertebrates I venture to offer a few comments, not only in the matter of generic names, but also in the treatment of specific variation. For the past hundred or more years the work of defining new genera has been in progress. At first these groups were founded upon characters contained only in the external parts of the animals, principally the shells of mollusks and other invertebrates. As the internal organs began to receive attention, new characters or combinations of characters were discovered which resulted in further splitting of older names, and in advancing subgenera to generic rank. Any one who has followed the development of the classification of the land Pulmonata under the epoch-making studies of Dr. Pilsbry, in which many new genera and higher groups have been diagnosed, can not but admit that the subject has been made clearer by the addition of the many generic groups.

This division into genera is a refinement of classification made necessary by our advance in knowledge of the structure of animal life. After all, classification is only for the interpretation of natural laws, including the separation of the various types of animal life into groups for purposes of use in different lines of investigation, and for this purpose nothing has been suggested that is in any manner an improvement over the modified Linnaean system now in use. Degrees of differentiation are well indicated by classes, orders, families and genera. Suggestions have been made from time to time that numbers or symbols would be an improvement, but every systematist knows full well that such systems would be totally out of the question for practical use.

[1] SCIENCE, 71: 26–28, 1930.
[2] SCIENCE, 71: 215–218, 1930.
[3] SCIENCE, 71: 317–319, 1930.