

LETTERS TO THE EDITOR

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[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

The Gulf-Weed (*Sargassum bacciferum*) a Means of Migration for Fishes and Marine Invertebrates

OWING to the October number of NATURE having been mislaid, I have not had an opportunity until lately of seeing Mrs. Merrifield's remarks upon Gulf-weed which appear in vol. xviii. p. 708, where the Bermudas are alluded to as a locality where this species grows *in situ*.

Having during my several visits to those islands of late years paid some attention to the Sargassum and its inhabitants, perhaps the few facts I am in possession of may prove interesting to botanists, and those who study the geographical distribution of marine animals.

The Bermudas, being situate within that somewhat circular area of the North Atlantic, formed by the currents of the Gulf Stream, the North African, and equatorial currents, within which exists that vast accumulation of weed known from the time of Columbus to the present day as the "Sargasso Sea," afford excellent opportunities for studying the plant in its floating condition, and also adherent in its natural state to the reef. During the winter months the prevailing gales, which are generally from south-east to south-west, bring to the islands large fields, as well as isolated patches, of the Gulf-weed, which prove a great boon to Bermudan farmers, who, but for this ocean waif, would often be minus manure sufficient to raise their root-crops with. To an observer a field of weed coming in from sea presents a somewhat variegated surface as regards colour, the major portion of it being of a dark brown, interspersed with spots and patches of light yellow. On closer inspection, these masses of floating weed are found to be inhabited by various species of pelagic and littoral crustaceans, particularly a small light brown crab, having a blotch of white on the carapace. Here and there the eye rests on a little pearly-white object, the well-known shell of that almost unknown cephalopod, *Spirula prototypus*, of Peron. The pretty purple shell of *Ianthina communis* is also to be seen, as are the singular forms of those truly oceanic aculephs, *Varella communis* and *Physalia pelagica*, which occasionally occur in large numbers, as they did during a heavy southerly gale on April 16, 1861, when countless myriads were literally wrecked upon the shores, together with the shells and rafts of *Ianthina*. About the margins of these floating fields, which are of some depth, may be seen various species of fishes, most of which have, no doubt, accompanied the fields, and lived in them, as game would do in a preserve where food and shelter are found. There is one species of fish which, above all others, seems to belong to the Sargassum, viz., the Marbled Angler (*Antannarius marmoratus*), which, from its peculiar arm-like pectorals, is specially fitted to rest upon the weed. Here it makes its wonderful nest amidst the mass, suspended by means of those silk-like fibres, which prove amply strong enough to support the large bunches of eggs, which hang like grape clusters within their orbicular case. These nests are occasionally to be found, but cannot be considered common; and only a few have been obtained from the weed on the Bermudan shore.

There is hardly a doubt that it is from this fish-preserve in mid-Atlantic that those tropical and semi-tropical forms which occur incidentally at the Bermudas, Azores, Canaries, Madeira, and also on the east coast of America, come, for I have frequently obtained from these masses of gulf-weed, species which are not recognised as Bermudan, and would probably never have visited the island waters unless under the friendly shelter of the weed. Moreover, I have observed even in heavy storms that the sea never breaks throughout these floating fields, but although heaving and swelling to the usual height, remains unruffled just as if oil floated on the surface. This absence of disturbance would of itself commend the field of weed to the fishes; but when we consider other suitable adjuncts, such as supply of food, and shelter from enemies, we cannot fail to realise the excellent means of migration which this common possession affords, not only to fishes, but to all kinds of those lower invertebrate forms,

many of which have most certainly been brought to the shores of the Bermudas by this means. The isolated patches of weed, which follow the course of the Gulf Stream, and become broken into lesser fragments, are also accompanied by those tropical and semi-tropical fishes which are found almost every summer on the coast of Nova Scotia, and even as far north as Newfoundland; and it is evident that without some such agency we could never account for the abundance of certain southern pelagic fishes which annually occur in our high latitude.

In regard to the original habitat of *S. bacciferum*, as also the origin of that vast mass of floating weed which exists in mid-Atlantic, and is wholly composed of this species, I fear we must await further oceanic exploration. Although I am well aware that it grows in certain places on the Bermuda shores, those shores, even if they were wholly clothed with it, could not supply a tithe of the material which forms the vast accumulation of the weed existing in the Sargasso Sea. As to the allusion in Mrs. Merrifield's paper (quoting Agardh), made concerning the *S. bacciferum* being an inhabitant of the banks of Newfoundland, and other parts of the coast of north-east America, I can safely say that it is wholly unknown on this coast, save occasional sprays, which are brought north by the Gulf Stream, as are the fishes I have before alluded to.

Halifax, Nova Scotia, January 25 J. MATTHEW JONES

The Highest Tide on Record

IN Lyell's "Principles of Geology," tenth edition, 1867, vol. i. p. 494, occurs a statement, given on the authority of Admiral Sir F. Beaufort, to the effect that the tides at Chepstow on the Wye sometimes rise to 69 and even to 72 feet. The statement is familiar to all who have read Lyell's work. If it be correct then this tide of 72 feet at Chepstow is apparently the greatest in the world, that in the Bay of Fundy being given as 70 feet in the extreme. I can find no authority for a tide so great as 72 feet at Chepstow other than that above cited. The old "Bristol Channel Pilot" books of 1821 and 1839 say nothing of the matter, as I am informed by Capt. Tizard, R.N., and the latest published "Pilot" gives 56 feet as the extreme rise of tide at Chepstow. There is thus no official knowledge of so high a tide as 72 feet, and I can find no published account of Admiral Sir F. Beaufort's observations; Sir C. Lyell refers to none such.

I should be extremely obliged to any reader of NATURE who can refer me to any certain record of exceptionally high tides at Chepstow and confirmation of Sir C. Lyell's statement. There seems to be some uncertainty as to whether the highest tides on record occur in the British Islands or not.

Exeter College, Oxford

H. N. MOSELEY

The Glacial Period and Geographical Distribution

PROF. ASA GRAY, in his very interesting lecture on the distribution of the forest trees of the northern temperate region (NATURE, vol. xix. p. 327), after pointing out the remarkable differences that exist between the forests of the eastern and western sides both of North America and the Old World, suggests that the great poverty of the European as compared with the Japan-Manchurian region in this respect was caused by the Mediterranean cutting off the retreat of the flora which then occupied Europe, as it retired, at the approach of the glacial epoch, before the ice from the north. This explanation derives considerable support from some other facts in geographical distribution. The most characteristic Alpine and Arctic butterflies of the Palearctic region belong to the three genera, *Parnassius*, *Chionobas*, and *Erebia*. Of *Parnassius*, Dr. Staudinger, in his latest catalogue (1871) enumerates fourteen Palearctic species, of which three occur in North and Central Europe, ranging as far south as the Balkans, but always in or near high lands, about a dozen occur in temperate Asia, ranging as far east as the Amur, and probably as many in North America, where they also are truly Alpine butterflies. Of *Chionobas* one species (*C. aello*, confined to the Alps) occurs in Central Europe, whilst six or seven others range from Lapland over Russia and Siberia, Mongolia, &c., to the Amur, and there are numerous species in Arctic and Alpine North America. Of *Erebia* there are forty-five Palearctic species enumerated by Staudinger, and of these no less than twenty-five occur in the central Alpine chains of Europe. The genus likewise ranges all over temperate Asia, going as far south as the Himalayas and Moupin, and in North