divided into two equal parts, the apical half smoky blackish, the basal half bright orange-tawny; the blackish inner edging, however, is always faintly, and sometimes strongly, represented: the secondaries are quite distinct from those of *P. alcinoe*, the basal spots being small and more restricted upon a reddish-tawny ground; beyond them is a diffused band (traversed by the dark veins and internervular streaks), its centre golden orange, its extremities whitish; the external area smoky brown, paler internally, sometimes becoming almost white as it merges into the central band. The female has primaries like those of *P. camerunica* ♀, but the basal spots of the secondaries are more restricted and their outer limit forms a straighter line than in *P. camerunica*, whilst the brown basal patch on which these spots are usually placed is infringed upon by the broader white central belt; the latter is more regular and of more uniform width throughout. Expanse of wings, ♂ 69–78 millim., ♀ 88 millim.

Sierra Leone (B.M. and Salvin & Godman Colls.).

We had long had a pair of this species in the Museum collection as *P. alcinoe* of Felder; the latter, however, is quite distinct, both sexes showing a well-defined and rather narrow dusky border to the secondaries. We have a pair from Accra.

Planema indentata, sp. n.

The male has smoky-brown primaries, similar to other species of the *P. alcinoe* group, but the belt across the wing, excepting that it is broader and golden orange, resembles that on the primaries of *P. elongata* ♂; the secondaries are like those of *P. macaria*, but much paler, the central area being broadly pale yellowish, almost inclining to whity brown, of course interrupted by the usual dusky veins and streaks; the female has the primaries marked somewhat as in *P. camerunica* ♀, but the broad white band has its inner edge nearly straight, two small notches alone indicating the angular excavations which characterize this band in *P. camerunica*: the secondaries are quite distinct, pale sandy yellow, the base narrowly brown, so that all the outer black spots are thrown into strong relief; the external border almost as narrow as in *P. alcinoe* ♀, but emitting much more prominent internervular blackish streaks to the middle of the wing. Expanse of wings, ♂ 78 millim., ♀ 100 millim.

One pair, Cameroons (Godman & Salvin Coll.).

The female was taken by Dr. Preuss at Barombi.

Quite recently Dr. Karsch has described a female *Planema* from Uganda under the name of *P. albicolor*, which he says

corresponds with the same sex of *P. consanguinea* so closely that the only difference of marking which he is able to point out is the slightly smaller size of the basal spots of the hind wings. "In the ♀ from Uganda, however, all the yellow and red-brown of the wings and body of *Planema consanguinea* are entirely white," a most singular statement! He means to say that the yellow and red-brown areas of *P. consanguinea* are replaced by white in the female from Uganda. I must express my positive conviction that this *P. albicolor* is nothing whatever but the rare albino form which constantly recurs in many species of *Acræa*, and which may also exist in some species of *Planema*. It is true, indeed, that the white forms of many species of *Acræa* have been described as distinct, but they always occur with the typical forms as either seasonal developments or simple sports; the following may be cited:—

	Tawny form.	*Yellow or white form.*
1.	Acræa Johnstoni, ♂.	Acræa flavescens, ♂.
2.	„ alciope, ♀.	„ carmentis, ♀.
3.	„ esebria, ♂ ♀.	„ protea, ♂ ♀.
4.	„ metaprotea, ♂ ♀.	„ Monteironis, ♂ ♀.
5.	„ apecida, ♂ ♀.	„ Cabira, ♂ ♀.
6.	„ vinidia, ♂ ♀.	„ tenella, ♂ ♀.
7.	„ Sganzini, ♂ ♀.	„ lycia, ♂ ♀.
8.	„ stenobæa, ♂ ♀.	„ cæcilia, ♂ ♀ *.
9.	„ caldarena, ♂ ♀.	„ neluska, ♀ only.
10.	„ acara, ♂ ♀.	„ pseudolycia, ♀ only.
11.	„ marmorata, ♂ ♀.	„ turna, ♂ ♀.
12.	„ percussa, ♂.	„ igati, ♂.

Several other species have a white as well as a tawny form of female; so that to found a new species upon a female alone, which (to all intents and purposes) differs in nothing but its white colouring from its nearest ally, is in the highest degree venturesome. Differences of pattern are alone to be relied upon in the *Acræinæ*, the ground-colour varies enormously, the width of the black apical patch varies seasonally, the number of spots on the under surface varies a good deal in certain species, but the position of the spots, the outlines of the bands, and width of the hind wing border do not appear to be variable in *Planema*, or very slightly so; but in *Acræa* the width of the outer border varies considerably.

* This is rather a pale than a white form, and is perhaps a climatic variety.

LVI.—*Some Remarks on the Dispersal of Marine Animals by means of Seaweeds.* By Rupert Vallentin.

Thanks to the patient investigations of Berkeley, Darwin, Sir Charles Lyell, and others, there are sufficient evidences of the dispersion of land-animals over the globe; but in the case of marine animals it is different. I have hunted in vain through the various publications to which I have had access to find records relating to the subject of this communication.

Early in the summer of last year while surface-netting in my boat about three miles south of Falmouth harbour, I noticed a large mass of *Fucus serratus* being swept away to sea by the ebbing tide. On further examination I found that this weed was suspended vertically in the water, the extremities of the fronds being just level with the calm surface of the sea. On securing this mass of weed, I discovered a large stone attached to its base which weighed three quarters of a pound. Numerous specimens of Hydroids and Polyzoa were also noticed attached to the fronds of this seaweed. Since then I have paid attention to these floating seaweeds when out in my boat, and have recorded my observations in a note-book kept for that purpose.

Attention may here be directed to the fact that the following remarks relate only to our in-shore waters, viz. at a distance not exceeding five miles from land, which is the farthest I have deemed it prudent to venture in so small a craft. Fortunately, however, I was successful in enlisting the co-operation of my friend Mr. J. Tucker, who went during last August from the Clyde to Norway. He was good enough to secure during the voyage specimens of seaweed which were floating in the water or else left stranded on the deck by the waves which occasionally swept over it during the exceptionally wild weather experienced while crossing the North Sea. The weeds thus collected were placed in sea-water in his cabin. Unfortunately the steward, not knowing for what purpose they had been gathered, threw them overboard. I was, however, able to discover that specimens of *Fucus* had been collected in abundance floating in the North Sea long distances from land.

We have had during the past summer strong winds from the west and south-west; and when these winds have been accompanied by a strong ebb-tide great quantities of *Zostera*, *Fucus*, *Chorda*, and other seaweeds are torn from their respective habitats and thrown on shore in the nearest cove. On many occasions the wind has suddenly changed to the

north-west or north, and if the sea has reached a higher level than before the change of wind occurred, large masses of various species of seaweed can be observed being carried to sea by the wind and tide during the following ebb. In addition to this I have quite recently noticed in the numerous creeks with which Falmouth harbour abounds single shells and stones resting on the muddy or sandy sea-bottom with specimens of *Fucus* of various sizes attached to them in a flourishing condition. In every instance the weed is able to maintain a vertical position in the water owing to the presence of the numerous air-vessels on the fronds. In some cases the weed is so large that it can almost float the stone or shell on which it is growing; in others, some time will have to elapse before that can be accomplished. Without much difficulty during any calm day at low-water one can secure similar specimens in all stages of growth.

Attention may here be directed to the rate of flow of the retiring waters during ebb-tides. I am informed by the pilots frequenting this port that under favourable conditions a floating body such as a mass of seaweed would easily be driven five miles from the harbour during an ordinary ebb-tide. If, however, this were supplemented by a fresh north or north-west wind these floating masses would be driven even beyond that limit. Possibly one tide would be spent before the influence of the shore currents would be lost on these floating objects, and before the channel tides would be able to exert their influence on them; but when once these latter came into play there is no knowing where they might be swept to.

Before proceeding further, I will now record some experiments I have made as to the powers of flotation of some of our common seaweeds in sea-water. I have had portions of *Fucus nodosus* floating in vessels of sea-water for eleven and a half weeks, and *F. serratus* for upwards of seven weeks. On the other hand, *Fucus vesiculosus* never floated longer than five weeks. Specimens of *Halidrys siliquosa* floated in some instances for three weeks, and other examples for as many months. Many specimens of *Zostera marina* were found to float never longer than three days; they then invariably sank to the bottom of the jar in which they had been placed. Attempts were also made to discover how long the fronds of *Chorda filum* remained floating in the water, and during calm days several examples were moored in very sheltered places in the harbour. But these experiments were invariably unsuccessful, mainly owing to the surface-motion produced by passing steamers. I may mention that all these various

species of seaweed were obtained either in the bay or harbour, where they were drifting about in the tideways after being detached from their respective habitats by the force of the waves.

As my most interesting results have been obtained from the class Mollusca it will be convenient to take my starting point from those animals. Mr. Wallace (1)*, under the heading of "Means of dispersal of Mollusca," writes as follows:— "The marine, fresh-water, and land mollusca are three groups whose powers of dispersal and consequent distribution are very different and must be separately considered. The Pteropoda and Ianthina and other groups of floating mollusks drift about in mid-ocean, and their dispersal is probably limited chiefly by temperature, but perhaps also by the presence of enemies or the scarcity of proper food. The univalve and bivalve mollusca, of which the whelk and cockle may be taken as types, move so slowly in their adult state, that we should expect them to have an exceedingly limited distribution; but the young of all these are free-swimming embryos, and they thus have a powerful means of dispersal, and are carried by tides and currents so as ultimately to spread over every shore and shoal that offers conditions favourable for their development." Prof. W. Sollas (2) remarks as follows:— "Perhaps one of the commonest ways by which marine animals obtain a distribution over extensive areas is by means of free-swimming larvæ. The peopling of the sea by slow-moving or attached forms has certainly been accomplished chiefly, if not almost wholly, in this manner."

I have been fortunate enough to secure two specimens of bivalve mollusks while being dispersed by floating seaweed; and, strange as it may appear, one was a specimen of *Cardium edule*, a long frond of *Chorda filum* being attached to the left valve by its base. This mollusk was secured a mile from land, and was found on examination to be alive and in a healthy condition. Unfortunately this specimen and the attached weed were placed after examination on the deck of my canoe, and were washed overboard by a wave. A short time later a fine living example of *Mytilus edulis* was secured under similar circumstances and weighed 23·3 grms. The weed, *Chorda filum*, was also in this instance firmly fixed to the left valve; it measured 310 centim. in length and weighed 43·3 grms. Had these mollusks escaped the notice of cod, pollock, or other fish which frequent the mid-water regions, they might have been carried by the currents on some shoal or bank, and so founded fresh colonies.

As *Chorda filum* invariably floats vertically, I have found

* These numbers refer to bibliographical list at end.

it very difficult to detect specimens drifting in the sea, unless there is an almost complete calm accompanied with bright sunshine.

Numerous examples of single valves of *Tapes pullastra*, *Ostrea edulis*, fragments of *Corallina*, and stones of various sizes have frequently been observed drifting in the tideways attached to the roots of *Chorda filum* and various species of *Fucus*.

Only two species of Nudibranchs have been secured on drift-weed. Two specimens of *Polycera quadrilineata* were found early in July, and several examples of *Acanthidoris pilosa* were captured early during the following month on masses of *Fucus serratus* while travelling seawards. On a similar clump of weed a large coil of spawn, deposited by *Aplysia hybrida*, was once noticed. Microscopical examination of these ova showed that segmentation was just completed.

The polychæte annelid, *Spirorbis borealis*, is very common on the fronds of *Fucus serratus*. It will be remembered that the embryos of this species are kept inside its tube until they are in an advanced condition and almost ready to lead an independent life. This fact doubtless greatly assists in the propagation of the species. Specimens of this annelid attached to the fronds of *Fucus serratus* can be secured in the tideways on almost any occasion.

Very frequently, particularly during the months of June, July, and August, specimens of *Idotea tricuspidata* have been found holding fast to the fronds of *Halidrys siliquosa*. These crustaceans are exceedingly difficult to detect, as they invariably adapt their colour to suit their surroundings, and also hold the stem of the drifting weed longitudinally.

The undermentioned species of Hydroids have been observed on drift seaweed: *Clava multicornis* and *Sertularia pumila* occur in abundance on the fronds of *Fucus versiculosus* and *F. serratus*, and *Aglaophenia pluma* at times covers the fronds of *Halidrys siliquosa*. The following examples of Polyzoa will be sufficient for my present purpose:—*Bicellaria ciliata* and *Mimosella gracilis* are both to be secured in abundance on the fronds of *Halidrys siliquosa*. *Membranipora pilosa*, *Flustra foliacea*, and *Valkeria uva* have repeatedly been observed alive and in a healthy condition growing on detached portions of *Fucus serratus* gathered in the bay and harbour. The common anemone, *Anthea cereus*, is usually to be found adhering to rocks in pools of water between tide-marks; it also luxuriates on the fronds of *Laminaria* a few feet below low-water mark. In sheltered places in Falmouth harbour large areas exist covered with sea-grass (*Zostera*