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TRANSACTIONS

OF THE

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VOLUME III.

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GARDEN.

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1797

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T R A N S A C T I O N S

OF THE

L I N N E A N S O C I E T Y.

I. *Observations respecting some rare British Insects. By the late Mr. William Lewin, F. L. S.*

Read November 5, 1793.

I. SPHINX apiformis. *Linn.*

TAB. I. Fig. 1—5.

THE *larva* of this insect feeds in the bark of the poplar tree, near the bottom, and changes to a *pupa* in April in the cavity it has eaten out, enclosing itself in a case formed of small pieces of the wood. The perfect fly comes forth in June. The male may be readily distinguished by its anus being slightly tufted. The margins of its wings are also darker, and not near so broad as in the female, which is moreover the larger of the two.

I have found these *larvæ* of different sizes in March. I took two of the smallest, and, making a hole in the bark of a lime tree, put them in and enclosed them. The following spring they were found arrived at their full size, and they afterwards changed to *pupæ* at

the usual time. They had fed only on the inner part of the bark, without touching the wood, just as they do in their usual food the poplar, though the lime tree bark is not half so thick.

This species is distinguished from the following by its mode of life, and difference of colour. It is also much bigger. The head is wholly yellow, the pectinated part of the *antennæ* orange, and the markings on the thorax much larger than in the *crabroniformis*, and nearly square. Neither is the whole insect of so dark a hue.

TAB. I. Fig. 1. Represents the male *Sphinx apiformis*.

2. The female.

3. The *larva* in its natural situation.

4. Pupa.

5. The same enclosed in its case.

2. SPHINX *crabroniformis*.

The Lunar Hornet.

TAB. I. Fig. 6—10.

Sph. abdomine flavo incisurarum marginibus atris, thorace nigro maculis obsoletis flavis, capite nigro basi annulo flavo.

The *larva* feeds on the wood of the fallow, *Salix Capræa*, in the heart of which it spins itself up in November, but does not change to a *pupa* till May following. The fly comes out in the middle of July.

This *larva* enters the wood near the surface of the ground, sometimes from the root, and feeds upwards (generally in the pith) for the space of six or eight inches; after which it turns its head downwards, and spins itself up with the web, there waiting the proper time to change.

From

From several years attention to this subject, I think the caterpillar does not enter the wood till the second year of its own age; as among all the numerous *larvæ* I have found from June to November, I could perceive but a slight difference in size. Probably therefore they may feed on the tender bark of the fallow root the first year after they are hatched; and it seems they eat into the wood about June.

TAB. I. Fig. 6. Is the male *Sphinx crabroniformis*.

7. The female.
8. The caterpillar in its proper situation.
9. The pupa, its head turned downwards.
10. The web closing the orifice, by which the animal had entered and must come out.

3. PHALÆNA Trifolii.

Bombyx Trifolii. *Fab. Mant.* 112.

The Grass Egger Moth.

TAB. 2. Fig. 1—4.

Its caterpillar feeds on Trefoil, and changes to a *pupa* in June. The fly comes forth the latter end of August.

These *larvæ* are to be met with on the uncultivated grassy chalk-hills of Kent, particularly near Darent wood. They secrete themselves under stones in the day, and come forth to feed in the evening.

The male fly has broad pectinated *antennæ*, a light coloured bar on the upper and under wing, a slender body, with a silky tuft at the anus. The *antennæ* of the female are indeed pectinated, but not to be perceived without a magnifier. It has only a faint bar on the upper wings, without the least sign of any on the under. The body is much larger, and terminates without a tuft.

TAB. 2. Fig. 1. *Phalæna Trifolii*, male.

2. Female.

3. Caterpillar.

4. *Pupa* in its case.

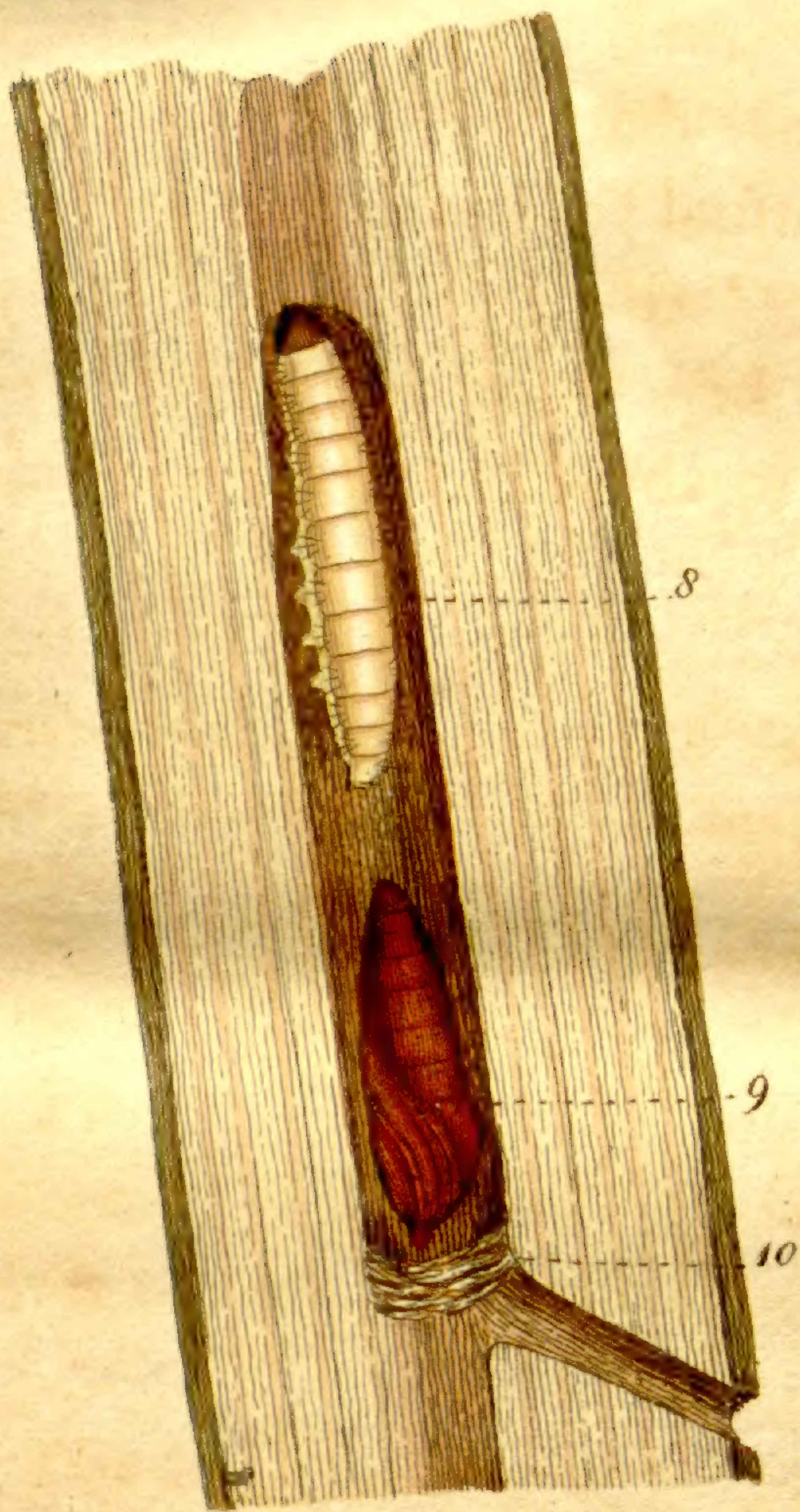
4. *ICHNEUMON chryfopus*.

TAB. 2. Fig. 5.

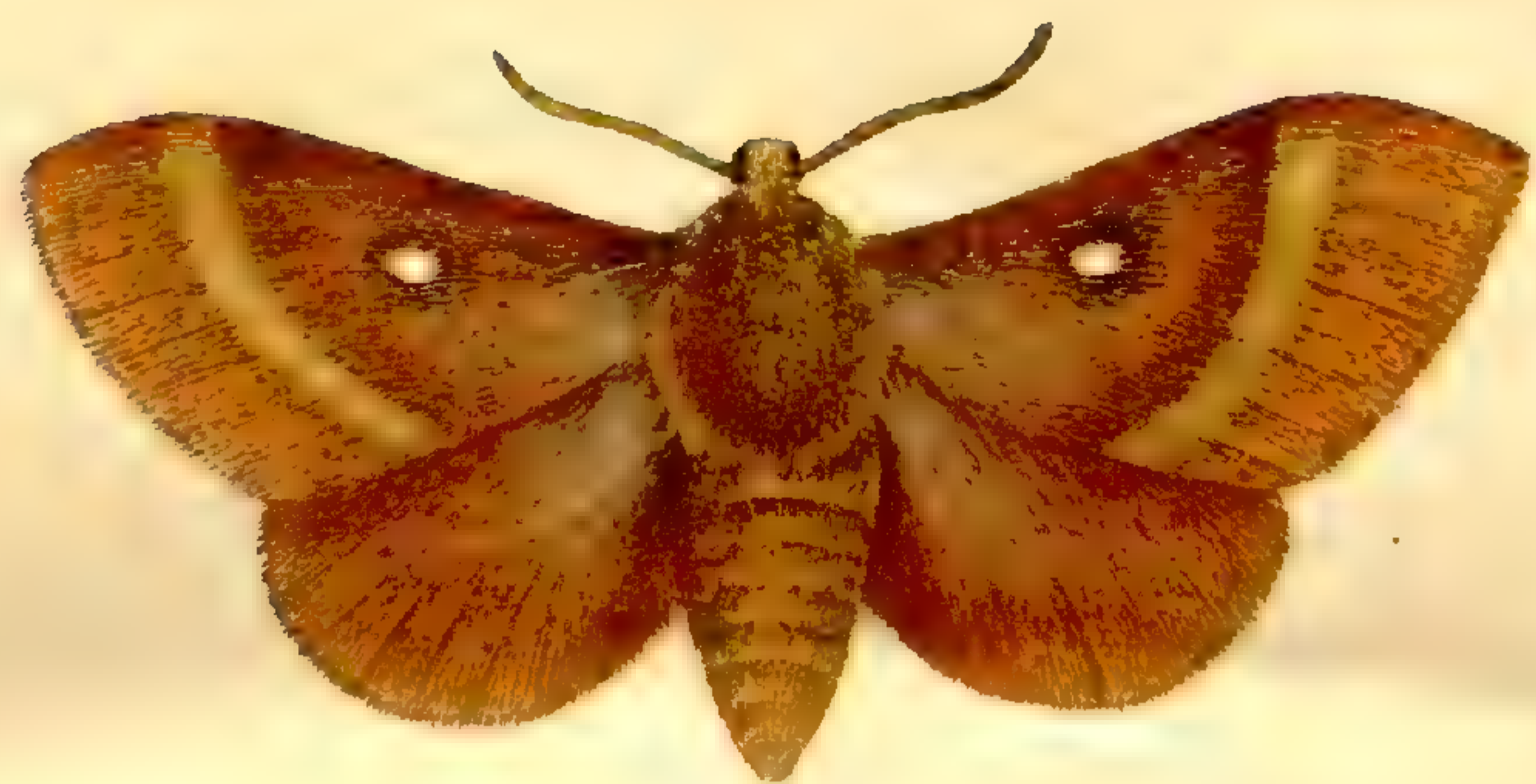
Ichn. thorace maculato, segmentorum abdominalium omnium marginibus pedibusque flavis*.

In 1790 I kept two *pupæ* of the above described *Phalæna*, from which the moth did not appear at the usual time, from August to the following May, when they produced this *Ichneumon*. I only bred two of them; and I conceive that here figured to be the female, as it is the largest. The other is in the cabinet of Mr. William Jones, F. L. S.

* DESCR. D. Marsham. *Antennæ* setaceæ, flavæ. *Thorax* niger, flavo variè maculatus; scilicet lineola ante alas; sub ortu alarum punctum flavum. *Scutellum* nigrum, punctis quatuor flavis. Pone scutellum punctum flavum utrinque. *Abdomen* nigrum, marginibus segmentorum flavis. *Pedes* flavi; femoribus basi nigris.



1-5 *Sph. apiformis*. 6-10 *Sph. crabroniformis*.



2



5



4



5

1-4. *Ph. trifolii*.
5. *Ichneumon chrysopus*.

II. *A curious Fact in the Natural History of the Common Mole, Talpa europæa, Linn. By Arthur Bruce, Esq. Secretary to the Natural History Society of Edinburgh.*

Read June 2, 1793.

THAT the mole does, in common with other quadrupeds and man, possess that spirit of curiosity which prompts to emigration and even to transmarine expeditions, I found out last summer from the best authenticated facts.

In visiting the Loch of Clunie, which I often did, I observed in it a small island at the distance of 180 yards from the nearest land, measured to be so upon the ice. Upon the island, Lord Airly, the proprietor, has a castle and small shrubbery. I observed frequently the appearance of fresh mole-casts, or hills. I for some time took it to be the water-mouse, and one day asked the gardener if it was so? No, he said, it was the mole; and that he had caught one or two lately. But that five or six years ago he had caught two in traps; and for two years after this he had observed none. But about four years ago, coming ashore in a summer's evening in the dusk, the 4th or 5th of June, 10 o'clock P. M. he and another respectable person, Lord Airly's butler, saw at a small distance upon the smooth water some animal paddling to, and not far distant from the island. They soon, too soon! closed with this feeble passenger, and found it to be our common mole, led by a most
3,
astonishing.

astonishing instinct from the nearest point of land (the castle hill) to take possession of this desert island. It was at this time for about the space of two years quite free from any subterraneous inhabitant; but the mole has for more than a year past made its appearance again, and its operations I was witness to.

In the history of this animal I do not at present recollect any fact so striking; especially when we consider the great depth of the water, both in summer and winter—from six to ten, fifteen, and some places as deep as thirty or forty feet, all round the island.

Edinburgh,
April 26, 1793.

III. *A History of Three Species of Cassida.* By the Rev. William Kirby
of Barham, A. L. S.

Read January 7, 1794.

CONVINCED of the truth of Mr. Marsham's observation *, that in order to form a complete system of entomology, we ought to be acquainted with the history of the different states of each particular insect; I take the liberty of offering to the Linnean Society an account of three species of *Cassida*, which I have had an opportunity of tracing through all their various metamorphoses.

The insects of the *coleopterous* class in general are little known in their previous states, on account of the difficulty of discovering their natural situation, and proper food. Yet this difficulty does not extend equally to all of them; for those of which I am about to give the history, require less attention to nourish, and bring to their perfect state, than most even of the *lepidopterous* insects: there is no danger of their escaping, even though they be not confined in a box. All that the breeder has to do, is to put a piece of the plant upon which he discovers them into a phial of water, taking care to supply them with fresh food when necessary, until he finds that they are preparing to change into the *pupa* state, which he may easily know by their ceasing to feed, and by their casting off the covering of excre-

* See his ingenious observations upon the *P. B. Lubricipeda* of Linneus, Linn. Transf. vol. i, p. 68.

ment under which they are concealed: then he is to take the leaf to which they have fixed themselves, and put it under a glass until the *imago* is disclosed, which will be in ten or twelve days.

I shall begin with some preliminary observations, that extend to all the species which I have had an opportunity of observing.

The larvæ of this genus are all surrounded with marginal radii, and these radii are usually ciliated, so as to give the insect, *sub lente*, a very singular and elegant form. They are also remarkable for being *merdigerous*, and for this purpose are furnished with some long stiff bristles just above the anus, upon which they deposit their excrement; and thus form a covering, not indeed very delicate, which I imagine serves to conceal them from the birds, and which I remember that accurate observer Reaumur noticed in the *C. viridis*. This shield, by means of the above-mentioned bristles, the little animal has the power of elevating or depressing; so that sometimes it stands at a right angle with the body, and at others is so closely applied to it, as to conceal the insect from any but an entomological eye.

In the *pupa* state, the head of these insects is enclosed in a shield, fringed with marginal radii. The abdomen is radiated like that of the larva, and is furnished with four *spiracula* on each side. It fixes itself by means of the *exuviae* of the larva. The *imago*, when it discloses itself, makes its way through a transverse fissure of the shield.

I. LIRIOPHORA. *C. nigra supra viridis, thorace emarginato, elytrorum futurâ basibus interne punctisque duobus nigris.*

Larva. Viridis, colore dilutiori punctata: radii lividi: caput nigrum, regione intra oculos viridi-nigro punctata.

Pupa.

Pupa. Saturate viridis spiraculis albis: clypeus emarginatus, respectu corporis latus: abdominis radii ovati acuminati.

Imago. Caput nigrum: antennæ subclavatæ, pallidæ, apicibus nigris: thorax subemarginatus, viridis, punctulatus: elytra viridia, macula longitudinali communi, quæ utrinque ad eorum insertionem dilatatur, atque florem lili ejusdam non injucunde refert, punctisque nigris: scutellum viride: abdomen nigrum ano pallido: pedes pallidi femoribus nigris.

Sequenti simillima, differt tamen non solum maculis elytrorum, sed etiam larvâ viridi, nec lividâ: pupæ clypeo emarginato nec integro: item imaginis thorace emarginato.

Nomen suggestit D. Præses. Habitat in Serratula arvensi.

2. VIRIDIS? C. nigra supra viridis, thorace integro.

Larva. Cinerea radiis nigris: caput nigrum: anus obtuse acuminatus: spiracula utrinque octo nigra.

Adhuc juvenis radii lividi, dorisque medium virescit.

Pupa. Fusco pallidoque varia: clypeus integer: abdominis dorsum utrinque lineis duabus punctorum nigricantium, quorum interiora majora: spiracula quatuor alba.

In pupæ exuviis albescunt radii.

Habitat in Serratula arvensi.

Observationes. An hæc species revera sit C. viridis perill. Linnei

plurimum hæreo: illius enim larva secundum Schrankium (Enum. Inf. Austr. 92.) viridis est, hujus autem cinerea. *C. viridis* in plantis verticillatis et *Carduis* habitare perhibetur; hanc nunquam inveni vel in plantis verticillatis vel in *Carduis*, sed solummodo in *Serratula arvensi*, quâ frequentissima deprehenditur ineunte Augusto. Litem dirimant entomologi cordati.

3. *MACULATA*. *C. nigra* supra viridis; elytris rarius: futura dorsali confertius: nigro maculatis.

Larva. Viridis, maculâ dorsali oblongâ nigrâ, lineis duabus longitudinalibus, parallelis, flavescentibus, ornatâ; has lineas contrahit vel dilatat animal dum pascit: caput nigrum linea viridi in tres lineolas exeunte: cauda bifeta fetis fasciculo spinularum coronatis. Hunc fasciculum deponit infectum in pupam converturum.

In hac specie stercus, quod admodum singulare, ramoso filamentosum est.

Pupa. Viridis puncto utrinque nigro.

Puparum exuviæ niveæ, punctis nigris restantibus.

Habitat in *Inulæ dysentericæ* foliis.

Observationes. Huic speciei quamplurimis simillima *Cassida Murræa* perill. Linnei. Maculæ in utraque sibi invicem admodum respondent, adeo ut varietatem *C. maculatæ*, *C. Murræam* crediderit D. Geoffroyus. Habitat hæc in *Inula dysenterica*, illa in *Helenio*. E pluribus larvis a me captis

ne una quidem *C. Murræa* exclusa est. Determinent feliciores entomologi quibus larva posterioris arrideat. In Helenio quærenda. Imago semel mihi lecta in prato quodam, semel etiam ab amico J. Coyte Gippovicensi entomologo ingenioso.

IV. *Observations relating to the Migration of Birds.* By Edmund Lambert, Esq. of Boyton near Heytesbury, Wilts. In a Letter to William Markwick, Esq. F. L. S.

Read April 1, 1794.

S I R,

MY son A. B. Lambert put lately into my hands the Transactions of the Linnean Society I could not help admiring your Remarks on the Migration of Birds; and as I am an old sportsman, and have spent much of my time in the fields and woods, I have not been wholly inattentive to the migration of the feathered race, and therefore take the liberty of making a few remarks on some of the birds, which you mention as having escaped your observation.

The Swallow.

I have seen swallows the last week in March at Stowey, near the Bristol channel, Somersetshire; and the last I saw was the 22d of November 1782. I observed two or three flying every day under the cliffs at Exmouth for a week: I left the place the 23d, otherwise I might have seen them later.

Goatsucker.

This bird flies late at night, and therefore is seldom seen. It lives chiefly on moths. Mr. Seymer, of Harford, Dorset (a great naturalist),

ralist), has complained to me of this bird; for, when he was sometimes on the point of catching a fine moth late in the evening (10 o'clock), this bird would come as swift as lightning and snap it up before him. I have shot two of these birds.

Woodcock.

The woodcock I once saw the first of October, N. S. in this inland county; and a couple was shot this present season that very same day on some heath about three miles from my house. But a person living at Uphill, the nearest point of land to the Steep Holms in the Bristol channel, and who rented that little island for the use of fishing, assured me he never knew the month of September pass without seeing woodcocks on that island. I have had two nests in my wood; the last was in the year 1789. It had four eggs. The old bird was loth to get out of the nest; as she had sat, as near as I could guess, about a fortnight. I took one of the eggs and blew it, and have it by me now. But I do not believe the young ones are ever bred up in this country to be shot at, as you have heard: for Mr. Seymer had one lived all the summer in a coppice near his house; and though it was a place well calculated to maintain a bird that lived on suction, yet the bird lost almost all his feathers, and could not fly for some time, so that it was often caught: but in the autumn it recovered its feathers and strength, and flew away. This I had from Mr. Seymer himself, and other gentlemen whom he used to shew the bird to.

Snipe.

The snipes breed in great numbers on the bogs in the New Forest, Hants; and always come to us in September, and sometimes in August. Some years ago two neighbours sent me five couple the second week in August, telling me at the same time they never saw them.

them more plentiful in winter. I went out the 15th myself, and killed three couple in a little time; and the weather being extremely hot, I was obliged to come home before I intended it. They were in as good condition as in winter.

Royston Crow.

The Royston crows are very plentiful with us all the winter, though an inland county. They lay on the downs, and frequent sheep-folds and highways; the latter, to pick the horse-dung dropped on the roads. I never observed the time they go and come.

Fieldfare.

The latest fieldfare I ever saw was the 1st of May in Dorsetshire; and the earliest the 29th of September, which was killed by my game-keeper.

Redwing.

The redwing makes its appearance in this country generally before the fieldfare, and leaves it sooner.

The Land Rail.

This makes its appearance the last week in April, and leaves us the second week in October. They breed with us, and I believe every where in England. I have taken the eggs and caught the young ones of all sizes; for when the dog points at them they will not fly till full grown, and then reluctantly, especially in the spring. They are continually making a creaking noise all the spring in the fields and grass grounds. I had one making that noise in my garden last spring for three weeks. They call them in Ireland corn creaks.

Water

Water Wagtail.

The water wagtail most certainly remains with us during the winter. I had three during this whole winter about the hot-houses and green-house, catching flies in warm days; but in cold weather they get down to the river, and eat the insects on the weeds which appear when the water is turned out of its course to water the meadows. I have seen all my life-time as many water wagtails in the winter as in summer; in the former at the river, and the latter about the houses.

You may depend on the truth of the above account; and I have nothing more to add, but that my observations on the other birds you mention totally agree with yours.

I am, Sir, with great respect,

Your obedient Servant,

EDMUND LAMBERT:

Boyton, near Heytesbury, Wilts.

I forgot to mention the rook's antipathy (as you observe) to the raven. The truth is, a raven will not suffer any bird to come within a quarter of a mile of its nest, being very fierce in defending it. Besides, they take the young rooks out of their nest to feed their own. This I was an eye-witness to at Mr. Seymer's; for there was no peace in the rookery night nor day, till one of the old ravens was killed and the nest destroyed. A raven has built in a large beech tree of mine time out of mind. I can trace it back above an hundred years. The tree is supposed to measure at least seven tons.

V. *Account of the Canis Graius Hibernicus, or Irish Wolf Dog, described in Pennant's History of Quadrupeds, 3d edit. vol. i. p. 241. By A. B. Lambert, Esq. F. R. and F. L. S.*

Read April 1, 1794.

THIS drawing of the Irish wolf dog was given me by Lord Altamont; done exactly the natural size of one in his Lordship's possession, at Westport, in the county of Mayo, Ireland, during my stay there in 1790. I had frequent opportunities of observing these dogs; Lord Altamont having eight of them, the only ones now in the kingdom. There is a man employed on purpose to take care of them; as they are with difficulty bred up and kept healthy.

I took the measurement of one of the largest, which is as follows: From the point of the nose to the tip of the tail, sixty-one inches; tail, seventeen and a half long; from the tip of the nose to the back part of the skull, ten inches; from the back part of the skull to the beginning of the tail, thirty-three inches; from the toe to the top of the fore-shoulder, twenty-eight inches and a half; the length of the leg sixteen inches; from the point of the hind-toes to the top of the hind-shoulders, thirteen inches; from the point of the nose to the eye, four inches and a half; the ears six inches long; round the widest part of the belly (about three inches from the fore-legs) thirty-five inches; twenty-six inches round the hind-part,



Irish Wolf Dog

part, close to the hind-legs; the hair short and smooth; the colour of some brown and white, others black and white.

—They seem good-tempered animals; but, from the accounts I received, are degenerated in size. They were formerly much larger, and in their make more like a greyhound.

TAB. 3. represents the Irish wolf dog on the scale of one inch and a half to a foot.

VI. *The Botanical History of Mentha exigua.* By James Edward Smith,
M. D. F. R. S. P. L. S.

Read June 3, 1794.

IN countries which have been the most completely examined with respect to their natural history, the science is still so far remote from perfection, that in some departments new productions are every day discovered, while in others we find ourselves perpetually in need of correction as to nomenclature. Few nations have had their botanical productions so fully elucidated as those of England and Sweden; yet such as look a little beyond the ken of vulgar eyes, find the *Floras* of both extremely imperfect, and our own particularly has more than one plant attributed to it upon very flimsy authorities. Perhaps the investigation of such doubtful natives may be as profitable as the search after new ones, provided we proceed cautiously and on sure critical grounds. If we disprove their authenticity we not only save trouble to compiling publishers in future, but, which is of infinitely more importance, we prevent much perplexity to honest practical students and collectors, who confide in such writers. These considerations induce me to inform my fellow-labourers in the botany of Great Britain, that they may for the future spare themselves the trouble of searching for *Mentha exigua*; and this is the more incumbent upon me, as I have myself
in

in this instance been instrumental in leading them astray, by confiding too heedlessly in my predecessors.

At some period between the publication of the first edition of *Species Plantarum*, 1753, and the *Centuria 2da Plantarum*, 1756 (*Am. Acad. vol. iv. 297*), Linnæus received from the late Mr. Philip Miller of Chelsea two dried specimens of an apparent species of *Mentha* (mint), marked *Mentha aquatica exigua Tragi, lib. i. cap. 6*. Upon what authority Linnæus considered this as an English plant I cannot precisely tell, nothing occurring on the subject in Miller's letters of that period. Probably the above synonym induced Linnæus to believe this was the plant so denominated in the third edition of Ray's *Synopsis*, p. 232, No. 2; and although he might readily perceive it was not the plant of Tragus, his figure being so very different, yet it might reasonably be presumed that Miller, by marking it so decidedly, knew it to be the plant of Ray, or rather of his editor Dillenius. Linnæus therefore without scruple quotes the *Synopsis*, and at the same time incautiously copies from thence two synonyms of Lobel and Fuchsius, which are both so dissimilar to the specimens then before him, that, with all my confidence in his accuracy, I cannot help attributing his omission of the name and page of Tragus, rather to carelessness than intention; for the figure of the latter is not more unlike the *Mentha exigua* than those of Lobel and Fuchsius. Thus however it was introduced into the *Centuria 2da Plantarum*, and *Syst. Nat. ed. x.* and in 1763 made its appearance in the second edition of *Species Plantarum*, p. 806, the specific character being taken from Miller's specimens, still preserved in the Linnean Herbarium, duplicates of which are in the collection of Miller himself, at present belonging to Sir Joseph Banks.

Mr. Hudson in the mean time published the first edition of his *Flora Anglica* in 1762, and on the authority of the *Cent. Plant.*

mentions *M. exigua* as an English plant, adding a new edition of Lobel's synonym from Parkinson, and copying the *Synopsis* for its place of growth. Whether he had afterwards found any variety of *M. Pulegium* which he took for the mint in question; whether his scruples arose from neither himself nor his friends having ever been able to detect *M. exigua* at all; or whether, which is most probable, the appearance and smell of the specimens in Sir J. Banks's herbarium decided his opinion, he inserted *M. exigua* in his second edition, 1778, as the very same plant with *M. Pulegium*; for, not having marked it with a greek β , it seems he did not even think it a variety.

Such was the state of the case when the Linnean Herbarium arrived among us. It was often consulted on this subject; and at length, in order to throw all the light upon it in my power, I published as exact a figure as I could delineate from one of the specimens, in my *Plantarum Icones hæctenus ineditæ*, tab. 38, taking the liberty to strike out all the synonyms except Ray (I ought rather to have said Dillenius), and expressing my doubts of even that. I mentioned a hint of Mr. Hudson's, that the original specimens might have been brought from Scotland by Houston. But this conjecture, as will hereafter appear, is totally groundless.

Since the above publication I have been so fortunate as to acquire what appears, almost beyond a doubt, the real plant of Dillenius. Sir Joseph Banks, not solicitous to encumber his herbarium with doubtful specimens, very obligingly presented me with a number of unsettled mints from Miller's collection. Among them is one with the following inscription in Buddle's hand-writing:

“ *Mentha verticillata minima odore fragrantissimo.* Buddle.

“ Flores huic minutissimi multi in unicum communem pedicu-
“ lum

“ lum perbreve, cauli per intervalla 7 vel 8 verticillatim positi.
 “ Tota planta hirsutiuscula, folia acuta, oblonga, et manibus com-
 “ pressa odorem spirant gratissimum, Rosæ eglanteriæ, &c.

“ This is the finest mint to smell to. I found it by the New
 “ River side near Stoke Newington. I shewed it your kinsman with
 “ four or five ferts more within a furlong of one another.

“ I take this to be *Mentha arvensis verticillata, folio rotundiore, odore*
 “ *aromatico, D. Vernon. R. Syn. (ed. 2.) 123.*

“ I want your opinion in this.”

From a comparison of the above writing with the passage in the *Synopsis* relative to the native place of the *Mentha* No. 2, I think there can be no doubt of mine being the original specimen gathered by Buddle in company with Mr. Francis Dale, and sent to the uncle of the latter, Mr. Samuel Dale, author of the *Pharmacologia*. It is moreover sufficiently like the figures of Tragus, Lobel, and Fuchsius, and may be the *M. gentilis* of Linnæus, as Dr. Stokes conjectured; but this point is not to our present purpose. I have only to add, that it has no resemblance to the *M. exigua*.

The latter therefore was still only known from Miller's specimens; but every practical botanist will readily conceive my joy, when in the summer of 1793 I found the same plant growing in the garden of my friend Edward Hasell, Esq. of Ipswich, where it was shewn to me as an unknown mint. It grew in an American border, and was said to have sprung up spontaneously. As this border had been furnished with bog-earth from the neighbourhood of Ipswich, it was to be presumed the roots had been introduced along with it. Here then was *Mentha exigua* restored to our English Flora, and I made haste to distribute specimens among those who were solicitous to possess such a treasure. The flowers were not advanced enough to determine whether it were really a *Mentha*; the

root being fibrous, instead of creeping, was very suspicious; and this circumstance decided it to be no variety of *M. Pulegium*, though in smell no two plants could be more similar. Roots were sent to Mr. Fairbairn at Chelsea, and fresh specimens to Mr. Sowerby, for his English Botany; but the latter were luckily not in a sufficiently perfect state to be drawn. I say *luckily*, for this ill-fated *Mentha* proves after all to be a non-entity; a casual inspection of the Linnean Herbarium having lately satisfied me, that it is neither more nor less than *Cunila pulegioides*.

Its native country is North America, from whence Kalm communicated a specimen to Linnæus, now in my possession, and at present accompanied by another, probably from Gronovius, referring to *Pulegium erectum, odore vehementi, flore violaceo, radice nequaquam reptatrice, Clayton*. Gron. Fl. Virgin. 8vo, p. 66. This plant in the 4th edition, p. 90, is made a *Melissa*, and a description is added, which agrees well with our *Mentha exigua*. It is not however my present purpose to write a history of this plant as *Cunila pulegioides*; all I mean now to establish is, that it has no right, under any name, to a place in our Flora Anglica; for there can be no doubt, that its seeds were brought to Mr. Hasell among earth from America, attached to the roots of some of the plants he is frequently receiving from thence, it having been sought for in vain near Ipswich, in the places from whence bog earth was brought to his garden. Whether it is really to be esteemed a *Cunila*, depends upon its having two stamina or four. In the latter case it may be a *Mentha*, a *Melissa*, or more probably, from its habit, annual root, and appearance of the corolla, a *Satureja*; and *Satureja viminea* has, like it, the exact smell of penny-royal. *Cunila* is altogether an artificial genus, made up of *Thymi*, *Saturejæ*, &c. which happen to have but two perfect stamina.

VII. *Observations on the Oeconomy of the Ichneumon Manifestator Linn.*
By Thomas Marsham, Esq. Sec. L. S.

Read July 2, 1794.

THROUGHOUT the whole system of animal œconomy, there is not perhaps a more striking and distinguished feature, than the attention, care and foresight of every parent animal for the protection and preservation of its young. It is a property which pervades every class of animals, and is equally manifest in the most ferocious and the more timid, the largest and the most minute. The methods employed by each class and order differ as much as the animals themselves. In the higher orders of beings which are viviparous, not to mention the human race, we find this care extended to a considerable time after the birth of the young, as in quadrupeds, who nourish their little ones with a delicate nutritious fluid, copiously supplied by nature from their own bodies, and with an anxiety and care evidently apparent to the most common observer, until they are able to provide for themselves. The feathered tribes, which are oviparous, furnish an extraordinary instance of fortitude and patience during the tedious time of incubation, and of labour and unwearied diligence in search of food, after the young are hatched. As we descend to the lower orders, which are in general oviparous, we may readily discern strong marks of sagacity or instinct.

Reptiles

Reptiles and fish display great penetration in the mode and situation in which they deposit their eggs and spawn; but to the eyes of the penetrating naturalist, this care and attention will appear more artfully employed and more eminently conspicuous in those minute beings called insects, who, although on a cursory view they seem to contradict the general remark, by never living to assist their future offspring, yet to an attentive observer exhibit a system of ingenuity and contrivance scarcely to be credited, in searching out and determining a proper place for depositing their eggs, not only in safety from their numerous enemies, but also in situations where a sufficient quantity of food is on the spot to support and nourish the larva immediately on its breaking the shell: and so securely and successfully is this generally done, that it not only eludes the inquisitive and prying eye of man, and is impenetrable to the large animals, but even defies the combined power of the elements; for so artful and sagacious do these minute beings appear in all their operations, and so admirably are they furnished with instruments peculiarly adapted to each species, that one would think it impossible for any accident to hurt or destroy them. Yet such is the divine law of order established by the omniscient Creator, that no animal, however minute, is permitted to increase beyond the bounds prescribed. And it is therefore wisely ordained, that the cunning, sagacity, or instinct of one insect shall counteract and render futile the skill and labour of another, so that the artful preservation of one kind tends to the entire ruin and destruction of its neighbour, by which means an equilibrium is preserved, and no one species preponderates. To enumerate the different genera, or describe the method employed by each species that has been observed to secure its eggs, would far exceed my limits. Suffice it to say, that they are placed on the trunks, leaves, and even roots of trees and plants,
in

in the waters, in putrid substances, and even on living animals. We find them closely united with a strong and firm cement round small branches of trees, fixed on elegant pedicles on the leaves, covered with hair from the body of the parent, or enclosed in delicate filken cases. These when hatched are visible, and their growth and wonderful operations may be seen and examined; but those who deposit their eggs in holes and crevices, in the bodies of animals, and even of insects themselves, are hatched, live, and come to perfection before they become visible, and we are content to know them in their last state only, and that imperfectly. The genus of insects called Ichneumon, from which I have selected a single species, has been ably described by the celebrated Reaumur, as far as he was then acquainted with their habits and œconomy. The whole of this genus are (if I may be allowed the expression) parasitical, that is, derive their support and nourishment from other insects, some depositing their eggs in the larva, others again in the pupa, and some even in the ovum or egg itself, the contents of which, minute as they are, are sufficient to support the young larvæ until their change into the pupa state. Some deposit only one egg in a place, as the *Ichneumon ovulorum*, and others again a great number, as *Ichneumon puparum*, &c. but whether the egg is placed in the pupa, larva, or ovum, the destruction of the foster-parent is inevitable. The larvæ of large moths or butterflies that have been wounded by an Ichneumon, live and feed, though with evident marks of disease, until these parasites are full fed, and able to change into their second or pupa state. To treat of each species of this genus, would fill a volume. I shall therefore confine myself to one, the *Ichneumon manifestator*, an insect truly wonderful in its formation, and which in a distinguishing manner unites the two properties before mentioned, viz. a penetration and fore-

sight bordering on sagacity, in finding a suitable situation for depositing its own eggs, and also rendering futile and abortive the labour and sagacity of another animal, who, to all appearance, had rendered its offspring perfectly secure.

ICHNEUMON MANIFESTATOR, Corpore atro immaculato, abdomine
Tab. 4. f. 1. sessili cylindrico, pedibus rufis.

On the 9th of June 1787, I discovered this insect settling on the top of an old post, as I was walking in Kensington gardens, and its peculiar appearance and extraordinary actions led me to observe it attentively. It moved rapidly over the top of the post, having its antennæ bent in the form of an arch, and with a strong vibratory motion feeling about until it came to a hole made by some insect, into which it thrust its antennæ quite to the head, *fig. 2.* It remained a minute at least in this situation apparently very busy, and then drawing out its antennæ came round to the exactly opposite side of the hole, again thrust in its antennæ, and remained nearly the same time. It next proceeded to one side of the hole, repeating the operation, the antennæ quivering in a surprising manner; and having now again drawn out its antennæ, turned about, and, dexterously measuring a proper distance, threw back its abdomen over the head and thorax, at the same time projecting its long and delicate tube into the hole (*fig. 3*); which when it had accomplished, it brought its body into a direct perpendicular situation, the two sheaths of the tube standing directly upright, as did the abdomen, while the tube itself proceeded from the anus down the under side of the abdomen into the hole. After remaining near two minutes in this posture it drew out the tube, turned round and again applied its antennæ to the hole for nearly the same time as before, and also inserted the tube in the same dexterous way. This operation was
 I repeated

repeated three times ; but approaching too near, in hopes with a shallow magnifier to observe what passed at the end of the tube, I frightened it away. My curiosity being excited, I waited, but in vain, for the return of the fly, and had it not in my power to visit the same spot for a week ; but on the 16th of the same month I was amply gratified, luckily seeing many of them at work. They appeared to pierce the solid wood with their tubes, which they forced in even to half their length, constantly passing them down the abdomen between the hinder thighs, which closed and kept them straight whenever any over-resistance forced them to bend. I was so astonished to see an instrument apparently weak and slender, able, with the strength of so small an animal to pierce solid wood $\frac{1}{2}$ or $\frac{3}{4}$ of an inch deep, that I attended to every motion of the insect, hoping to discover in what manner it was done ; and on very particular attention I observed, that all those who appeared to pierce the solid wood, did it through the centre of a small white spot resembling mould or mildew, which on minute examination with a magnifier I found to be fine white sand, which delicately closed up a hole made by the *Apis maxillosa*, and where I have no doubt the bees' young were deposited. In deep holes that were not closed, the insect not only thrust in the whole tube, but in some cases the whole of the abdomen and posterior legs, leaving out only the two fore-feet and wings, which it placed in contrary directions like two arms. The grooves which inclose the tube were also projected up the back, with the ends appearing above the head out of the hole.

In October I saw another of these insects on a strong post, on Lessness Heath, near Erith in Kent. It had fixed its tube before I arrived, and I waited a considerable time, in hopes it would withdraw it ; but a gentleman who was with me being impatient, and doubting my account of it, I with difficulty forced the insect to draw

it out, and then opened the hole, which was closed with a stiff pellet of turpentine.

Each succeeding year I had opportunities of seeing many of these insects at work ; but on the 23d of July 1791, I again paid very particular attention to some I saw in Kensington gardens, but more immediately to the action of the antennæ, which they thrust into many holes and crevices, but soon drew them out, not finding, I presume, a proper situation for their eggs. I observed one with its tube inserted into the side of a rail, which I watched with great attention (*fig. 4.*) It had fixed itself over a small patch of reddish sand that covered the hole of the *Apis maxillosa*, three of its legs being placed on each side the spot ; the abdomen was bent inward, so that the end of it was embraced by the hinder thighs, which kept it in a steady position, the whole tube being inserted in the rail. It frequently drew out the tube about $\frac{1}{4}$ or $\frac{3}{8}$ of an inch, and thrust it in again with great force ; in the interim between these thrusts, I could plainly perceive a motion in the apex of the abdomen connected with the tube similar to the pulsation of an artery, which motion ceased whenever the action of the tube took place. This pulsatory motion I conceive was occasioned by the eggs passing from the body of the insect to the tube ; and I felt an inclination to seize the little animal at the moment and examine the tube, which is of a fine crimson colour and semi-transparent, to see if an egg might remain in it : but an anxious desire to see the whole of its operation prevented me ; and when it had finished its work and withdrawn the tube, it was too late.—Another particular instance of sagacity in this little animal is worthy of remark : the grooves or cases of the tube were as usual projected in a straight line from the abdomen ; but the wind being very powerful, rendered it difficult for this delicate animal to maintain its situation, as these long cases,
which



Ichneumon manifestator Linn.

which are feathered (*fig. 5*), were so strongly acted upon by the wind as to endanger its being overfet several times. To remedy this inconvenience, it, with a wonderful dexterity, brought them down between its legs, and projected them forwards under its body toward the head, by which means it retained its situation securely. It is now seven years since I began my observations on this little animal, in which time I have never been able to discover an *Ichneumon* that I could suspect to be the male, and am therefore led to make these remarks public, in hopes some gentleman may have been more successful, and by whose means its history may be completed.

EXPLANATION OF TAB. 4.

- Fig. 1—4. Represents the *Ichneumon manifestator* in the several positions described in the preceding paper.
5. The tube and its sheaths highly magnified.

VIII. *Description of a new Species of Opercularia. By Mr. Thomas Young, F. R. and L. S.*

Read October 7, 1794.

OPERCULARIA paleata.

CHAR. GEN. *COROLLA* monopetala, quadrifida. *Capsulae* in receptaculum commune coalitæ.

Genus hoc facile ab omnibus aliis fructu distinguitur; in ordine naturali decimo octavo L. P. B. *Aggregatis* locandum; in systemate Linnæano inter Allioniam et Knautiam, interque Crinitam et Eveam editionis Gmelini: hic autem in synopsis pessime ad tetracocos refert. Pertinet ad Jussieui classem undecimam, *Rubiaceas*; ordinem decimum, inter Patabeam et Eveam.

OPERCULARIA paleata, receptaculo globoso paleaceo.

Hæc species a tribus aliis hujus generis a Gærtnero descriptis calyce paleisque receptaculi tantum differt ut genus proprium merito constituere posse principio crediderim, nomenque *Cryptospermum*, quod femina in cryptis occultantur, imposuerim. Monentibus autem summis viris, ne generum numerum jamdudum nimis magnum inconsulto augerem, conjungique hanc speciem volentibus cum Gærtneri Operculariis, donec plures congeneres innotescant, eorum judicio non invitus cessi. Certe nec nomen nec character Gærtneri bene in hanc plantam convenit; sique posthac quisquam separare voluerit, non male nomine *Cryptospermi* appellaverit.

Provenit

Provenit anno 1793 apud celeberrimum Curtisium, ex humo e Nova Hollandia allata; ille cultori eximio Fairbairnio tradidit, quo curante nunc in tepidario horti Chelseiani floret, mense Julio et Augusto 1794.

Radix perennis, fibrosa.

Caulis herbaceus, quatuor pedes altus, crassitudine infra digitum auricularem, erectus, obsolete tetragonus, glaber, substriatus, ramosus, viridis, fusco striatus: rami oppositi patententes.

Folia opposita, patentia, sessilia, ovato-lanceolata, integerrima, acuta, aliquando acuminata, glabra, viridia.

Stipulae laterales, juxta paria singula foliorum binæ, bipartitæ: laciniis divaricatis, reflexis, subulatis, virescentibus; setas subternas fuscas gerentes.

Flores aggregati, terminales, pedunculati: pedunculo floris longitudine, solitarii, primo erecti, nuptiarum tempore cernui, postremo iterum erecti, qua bipartitur caulis prodeuntes.

Calyx communis hexaphyllus, foliolis patentissimis, subulatis: duobus oppositis longioribus, inque bracteas aliquando dilatatis, ut calyx par summum foliorum cum stipulis imitetur, pallide virescens. Perianthium proprium e paleis receptaculi, superum, triphyllum: foliolis curvis, setaceo-subulatis, persistens, pallide virescens, demum apice fuscum, corolla paulo brevius.

Corolla universalis æqualis, subvigintiflora; propria monopetala, quadrifida, ante nuptias ovata, capsulam mentiens, deinde campanulata laciniis revolutis, minute pilosa, decidua, pallide virescens, apice rubicunda.

Stamina: Filamenta quatuor filiformia, corolla duplo longiora receptaculo inferta, antherarum dorso incumbentia, pallide virescentia; Antheræ oblongæ, basi emarginatæ, biloculares, longitudinaliter

tudinaliter dehiscentes, fusco-albidæ; Pollen rotundum, pallide virescens.

Pistillum: Germen inferum, receptaculi partem efficiens; Stilus simplex, longitudine corollæ, filiformis, ruber; Stigma bipartitum longitudine stili, filiforme, subtomentosum, rubrum.

Pericarpium: Capsulæ uniloculares in receptaculum subglobosum coalitæ, singulæ medio longitudinaliter dehiscentes, ut excidant simul subquinorum partes dimidiæ inter se in orbem conjunctæ.

Semen solitarium, ovatum, scabrum, hinc fulcatum, virescens.

Odor et Sapor subnauseosus, velut olerum putrescentium.

Propius accedit ad *Operculariam asperam* Gærtneri.

EXPLICATIO ICONIS 5.

Fig. 1. Plantæ pars magnitudine naturali.

2. Stipula aucta.

3. Calyx communis.

4. Corolla immatura.

5. Corolla matura.

6. Corolla, cum calyce proprio, staminibus et pistillo, aucta.

7. Stamen, auctum.

8. Anthera deflorata, aucta.

9. Pollen, auctum.

10. Pistillum, auctum.

11. Fructus immaturus, auctus.

12. Pars receptaculi conjunctim cadens, aucta.

13. Semen.

14. 15, 16. Semen auctum.

17. Semen sectum transverse, auctum.



J. Young delin.

Opercularia paleata

IX. *Descriptions of Eight new Fishes from Sumatra.*
By Mr. Mungo Park, A. L. S.

Read November 4, 1794.

THE following paper is the fruit of my leisure hours during nine weeks stay on the coast of Sumatra: it contains a very small specimen of the ichthyological riches of that shore, and, being my first attempt, the descriptions may in many places be inaccurate.

CHAETODON canaliculatus.

C. spinis omnibus canaliculatis.

B. 4. D. $\frac{13}{23}$. P. 18. V. $\frac{2}{5}$. A. $\frac{7}{8}$. C. 18.

LC : A :: 66 : 26	LC : VI :: 66 : 22
LC : DI :: 66 : 18	LC : VF :: 66 : 40
LC : DF :: 66 : 60	LC : AI :: 66 : 35
LC : PI :: 66 : 16	LC : AF :: 66 : 60
LC : PF :: 66 : 27	LC : PC :: 66 : 82

R. 5. P. 2. D. 2.3.4. V. 2. A. 3.4. C. 5.

Habitat in Sumatræ littore, supra flavo-virescens, subtus albicans guttis lævioribus adspersus, squamis minutis obovatis vestitus, carne sapida.

Oculorum iris argenteo-flava; branchiarum apertura mediocris, operculum laminâ duplici constans; linea lateralis dorso parallela; anus inter pinnas ventrales, capiti propior quam caudæ; pinnae virescentes immaculatæ; cauda bifida.

CHAETODON *trifasciatus*.

C. longitudinaliter striatus, fasciis tribus capitis nigris.

B. 4. D. $\frac{13}{35}$. P. 14. V. $\frac{1}{6}$. A. $\frac{3}{21}$. C. 16.

LC : A :: 36 : 25

LC : VI :: 36 : 13

LC : DI :: 36 : 16

LC : VF :: 36 : 22

LC : DF :: 36 : 35

LC : AI :: 36 : 26

LC : PI :: 36 : 12

LC : AF :: 36 : 35

LC : PF :: 36 : 21

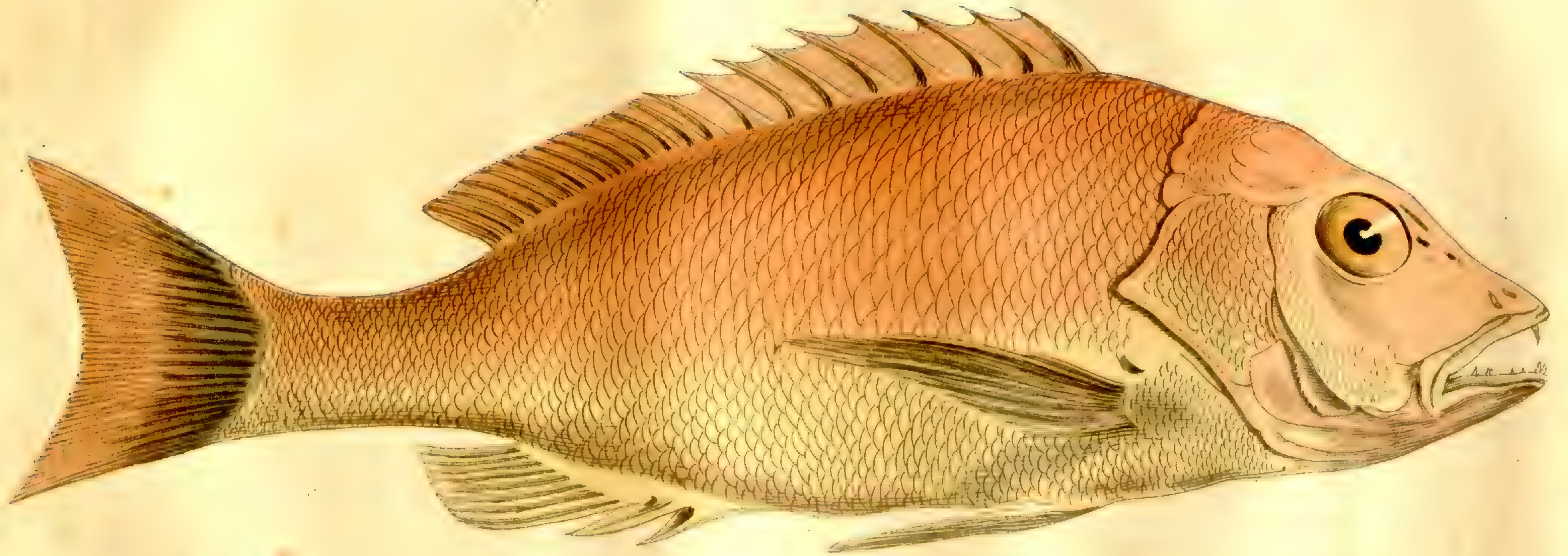
LC : PC :: 36 : 43

R. 4. D. 2.3.4. P. 2. V. 2. A. 3.4. C. 4.

Habitat in Sumatræ littore, inter corallia, 3 pollices longus, striis 16 fuscis longitudinalibus, squamis ciliatis, in trunco magnis, in capite exilibus vestitus, fascia nigra flavo marginata, in pinna dorsali, altera ad basin pinnae analis, tertia per caudæ medium insignitus.

Oculorum iris fusca; os perexiguum; branchiarum operculum ex duabus laminis constans; linea lateralis dorso propinqua, ad finem pinnae dorsalis interrupta; anus caudæ propior; pinnae flavæ; cauda subrotunda.

Linn. Trans III. tab. 6. p. 35.



Perca lunulata.

PERCA *lunulata*. TAB. 6.

*** Dorso monopterygio, cauda bifida.

P. rubescens, lunula caudali nigra.

B. 7. D. $\frac{10}{24}$. P. 16. V. 7. A. $\frac{3}{12}$. C. 17.

LC : A :: 64 : 41	LC : VI :: 64 : 26
LC : DI :: 64 : 27	LC : VF :: 64 : 38
LC : DF :: 64 : 53	LC : AI :: 64 : 45
LC : PI :: 64 : 22	LC : AF :: 64 : 53
LC : PF :: 64 : 40	LC : PC :: 64 : 78

R. $3\frac{1}{2}$. D. 2.3. P. 2. V. 2. A. 3. C. $3\frac{1}{2}$.

Habitat in Sumatræ littore.

Vertex convexus nudus; mandibulæ æquales; dentes conici parum curvati, canini validi in mandibula superiore; pinnæ ventrales auratæ, reliquæ rubescentes.

PERCA *aurata*.

P. albicans, vitta longitudinali flava.

B. 5. D. $\frac{10}{19}$. P. 18. V. 6. A. $\frac{3}{10}$. C. 18.

LC : A :: 56 : 36	LC : VI :: 56 : 24
LC : DI :: 56 : 24	LC : VF :: 56 : 37
LC : DF :: 56 : 49	LC : AI :: 56 : 37
LC : PI :: 56 : 21	LC : AF :: 56 : 47
LC : PF :: 56 : 34	LC : PC :: 56 : 75

R. $3\frac{1}{2}$. D. 1.2.3. P. 2. V. 2. A. 2.3. C. $3\frac{1}{2}$.

Habitat in Sumatræ littore.

Oculi magni iride flava; sub oculo spina unica reflexa; dentes parvi acuti; branchiarum opercula anteriora pone dentata; posteriora subintegra; linea lateralis dorso propior, conspicua, posteriorius parum curvata; pinnæ pectorales pallide flavæ, cauda flava, reliquæ fusco-albicantes.

PERCA *sumatrensis*.

P. corpore obscuro-argenteo, pinnis longitudinaliter striatis.

B. 5. D. $\frac{12}{21}$. P. 14. V. 6. A. $\frac{3}{11}$. C. 18.

LC : A :: 21 : 14 LC : VI :: 7

LC : DI :: 21 : 7 LC : VF :: 12

LC : DF :: 21 : 19 LC : AI :: 14

LC : PI :: 21 : 7 LC : AF :: 18

LC : PF :: 21 : 10 LC : CF :: 26

R. 4. D. 2.3. P. 2. V. 2. A. 3. C. 4.

Habitat gregaria in Sumatræ littore, inter corallia, 3 circiter pollices longa, squamis parvis denticulatis fusco punctatis vestita.

Caput parvum cuneatum naso fronteque fuscum; oculi iride fusco-argentea; os exiguum, mandibula inferior paulo longior; linea lateralis dorso parallela, ad finem pinnæ dorsalis deorsum leviter inflexa; pinnæ pectorales et ventrales flavæ, reliquæ fuscæ flavo striatæ.

SCOMBER *filamentosus*.

S. pectore nudo, pinna secunda dorsi et ani filamentosa.

B. 7. D. $\frac{6}{22}$. P. 19. V. 5. A. $\frac{2}{18}$. C. 22.

LC : A :: 66 : 38 LC : PF :: 66 : 45

LC : DPI :: 66 : 30 LC : VI :: 66 : 26

LC : DPF :: 66 : 35 LC : VF :: 66 : 35

LC : DSI :: 66 : 40 LC : AI :: 66 : 43

LC : DSF :: 66 : 62 LC : AF :: 66 : 62

LC : PI :: 66 : 20 LC : CF :: 66 : 88

R. 4. DP. 2. DS. 2.3.4. P. 2.3. V. 2. A. 2.3.4. C. 4.

Habitat in Sumatræ littore, argenteus, supra cærulefcens, squamis parvis persistentibus tectus.

Caput anteriùs obtusum; oculi magni; iride flava; mandibulæ dentibus parvis confertis armatæ; branchiarum opercula triplicia,

triplicia, integra, nuda; spinæ duæ ante pinnam analem, posteriore majore; pinnæ flavescentes, dorsalis prima in fossula recondenda, pectorales falcatae, cauda bifida.

BALISTES niger.

B. dorso triacantho, corpore nigro papilloso, cauda subintegra apice alba.

D. $\frac{3}{3}$. 27. P. 14. A. 24. C. 10.

LC : A	:: 48 : 36	LC : PI	:: 48 : 18
LC : DPI	:: 48 : 22	LC : PF	:: 48 : 24
LC : DPF	:: 48 : 29	LC : AI	:: 48 : 37
LC : DSI	:: 48 : 35	LC : AF	:: 48 : 46
LC : DSF	:: 48 : 45	LC : CF	:: 48 : 60

R. 3. DP. 2. DS. 2.3. P. 2. A. 2.3. C. 3.

Habitat in Sumatræ littore, inter corallia.

Oculi fere verticales, oblongi, iride fusca; aculei caudales parvi, reversi, septemplici ordine dispositi; pinna dorsalis anterior niger, caudalis flavicans, reliquæ flavæ.

BALISTES undulatus.

B. pinna dorsali anteriore triradiata, caudæ lateribus spinis valde robustis recumbentibus, corpore nigro lineis rubris undulato.

B. 2. D. $\frac{3}{3}$. 26. P. 13. V. 24. C. 12.

LC : A	:: 82 : 61	LC : PI	:: 82 : 32
LC : DPI	:: 82 : 36	LC : PF	:: 82 : 40
LC : DPF	:: 82 : 48	LC : AI	:: 82 : 64
LC : DSI	:: 82 : 58	LC : AF	:: 82 : 78
LC : DSF	:: 82 : 77	LC : CF	:: 82 : 104

R. 3. DP. 2. DS. 2.3. P. 2. A. 2.3. C. 3.

Habitat

Habitat in Sumatræ littore.

Caput magnum, obtusum; oculi iride fusca; fasciæ tres rubræ, a labiis ad basin pinnarum pectoralium excurrentes; truncus lineis duodecim rubris oblique undulatus; spinæ caudales validæ, anteriores glabræ, corneæ; pinna dorsalis anterior nigra, reliquæ flavæ; cauda subintegra.

X. *Lindsaea*, a new Genus of Ferns. By Jonas Dryander, M. A.
 Libr. R. S. and F. L. S.

Read November 4, 1794.

THE ferns belonging to this genus have so much the habit of *Adiantum*, that M. Aublet and Professor Swartz have referred to that genus the species discovered by them, though they ought, according to the generic characters of Linnæus, to have been referred to *Pteris*. In examining the *Filices dorsiferæ* in Sir Joseph Banks's herbarium, for the purpose of investigating the membranes which cover the fructifications, I soon discovered a great difference between these supposed *Adiantums* and the genera of *Adiantum* and *Pteris*. In *Adiantum* the fructifications, being distinct spots, are covered by lunular membranes attached to the margin of the frond and open towards the disk; in *Pteris* the fructifications form a line along the margin of the frond, and are covered by a linear membrane fastened to the margin of the frond, and open towards the disk; but in this genus the fructifications form a line parallel with the margin of the frond; in some species close to it, in others more or less remote from it; but in all, the covering membrane is attached to the disk within the line of fructifications, and opens towards the margin of the frond.

I have named this genus from Mr. John Lindsay, an assiduous
 and

and skilful botanist in Jamaica, whose paper on the germination of ferns, printed in the last volume of our Society's Transactions, may entitle him to be particularly remembered in treating of this order of plants. Our President, with whom I communicated my determination of this genus, has already introduced it in his valuable arrangement of the *Genera Filicum Dorsiferarum*, published in the fifth volume of the Memoirs of the Academy of Turin.

LINDSÆA. *Smith in Act. Taurin.* 5. p. 413.

Fruëificationes in linea continua, margini parallela.

Involucrum lineare, continuum, disco adnatum, externe liberum.

Habitus generis.

E frondis vel pinnæ basi *Nervi* omnes exeunt, dichotomi.

Locus natalis.

Asia et America inter tropicos.

Species.

1. LINDSÆA *sagittata*, fronde simplici sagittata cordatave acuminata.

Adiantum sagittatum. *Aubl. guian.* 964. *tab.* 366. *Lamarck*

Encycl. 1. p. 41.

Habitat in Guiana Gallica. *Fusée Aublet.*

In Sir Joseph Banks's herbarium are six fronds of this species from M. Aublet, out of which only one is sagittate; all the rest are cordate. The character of the genus is not ill expressed in Aublet's figure of part of the frond, numbered 1.

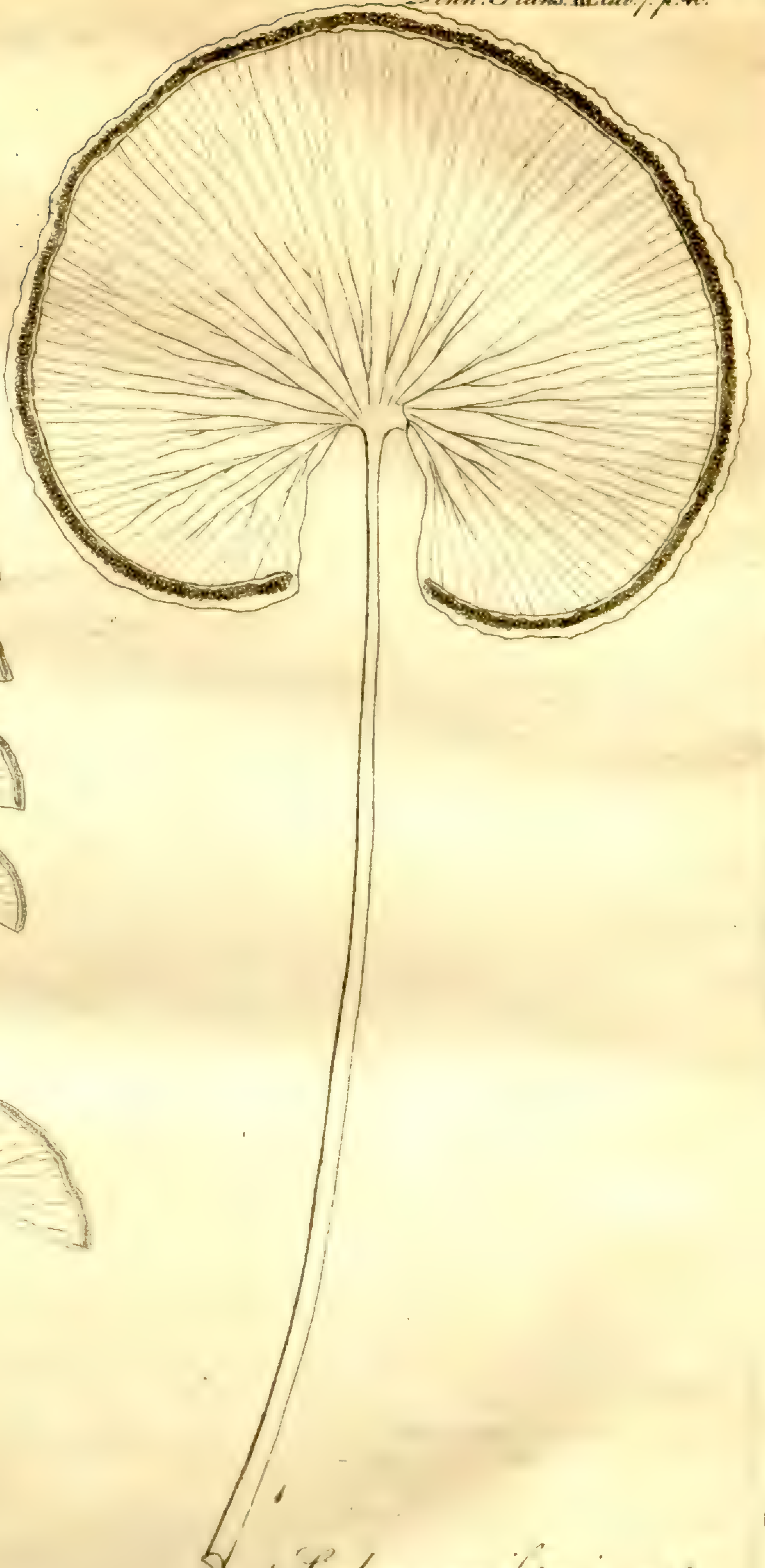
2. LINDSÆA *reniformis*, fronde simplici reniformi obtusissima.

TAB. 7, fig. 1.

Habitat in Guiana Belgica. *Alex. Anderson.*



2 *Lindsaea sulcata*. n. 3



1 *Lindsaea reniformis*. n. 2



2 *Lindsaea flabellulata*. n. 5.

1 *Lindsaea heterophylla* n. 4.

This species comes very near to the foregoing, but differs in the frond being broader than it is long, and entirely without any apex. The sinus at the basis of the frond is also more open than in the foregoing. The stipes is of a glossy brown colour, as in the first. In both, the line of fructifications is at a distance from the margin.

3. *LINDSÆA falcata*, fronde pinnata: pinnis falcatis integerrimis.

TAB. 7, fig. 2.

Adiantum 7. *Aubl. guian.* 965. (excluso synonymo.)

Habitat in Guiana Gallica. *Fusée Aublet.*

Stipites dodrantaes et ultra, inferne brunnei, superne fusci: angulis viridibus e pinnis decurrentibus. *Frons* vix longitudine stipitis. *Pinnæ* confertæ, unciales et ultra. *Fructificationes* marginales.

This fern was in Aublet's herbarium as his 7th *Adiantum*, but is not at all like the figure of Sloane he quotes.

4. *LINDSÆA heterophylla*, fronde pinnata: pinnis integerrimis ferrulatisve: inferioribus rhombeo-lanceolatis acuminatis; superioribus rhombeis obtusissimis; extimis confluentibus.

TAB. 8, fig. 1.

Habitat in India Orientali: Malacca.—*Robertson.*

Stipites vix palmares, inferne fusci. *Frons* longitudine stipitis.

Pinnæ parum remotæ, figuræ et magnitudinis diversæ: aliæ sesquunciales, aliæ semuncia breviores. *Fructificationes* marginales.

5. *LINDSÆA flabellulata*, fronde pinnata: pinnis flabelliformibus denticulatis: adultiorum inferioribus pinnatifidis. TAB. 8, fig. 2.

Habitat in China, prope Canton. Dom. *Georgius Staunton*, Baronetus. In Macao. *Dav. Nelson*. In Sumatra. *Car. Miller*.

Stipites palmares, fusci, inferne brunnei. *Frons* stipite fere longior. *Pinnæ* remotæ femuncia breviores: adultiorum infimæ pinnatifidæ, unciales et ultra. *Fruëctificationes* marginales.

6. *LINDSÆA trapeziformis*, fronde bipinnata: pinnis patentibus lanceolatis: pinnulis trapeziformibus: infimis flabelliformibus. TAB. 9.

Habitat in Indiæ Occidentalis insula Grenada. *Henr. Smeathman*.

Stipites inferne fusci. *Fronde* juniores simpliciter pinnatæ: pinnis crenatis sterilibus; adultiores bipinnatæ: pinnulis confertis integerrimis undulatis femuncialibus. *Fruëctificationes* intra marginem. Figura characteris generici, *Smith loc. cit. tab. 9, fig. 4.* e pinnula infima hujus speciei desumpta.

7. *LINDSÆA guianensis*, fronde bipinnata: pinnis patentibus subulatis: pinnulis inferioribus lunatis; mediis trapeziformibus; supremis flabelliformibus.

Adiantum guianense. *Aubl. guian. 963, tab. 365. Lamarck Encycl. I. p. 43.*

Habitat in Guiana Gallica. *Fusée Aublet.*

8. *LINDSÆA stricta*, fronde bipinnata: pinnis erectis strictis: pinnulis trapeziformibus.

Adiantum strictum. *Swartz proar. 135.*

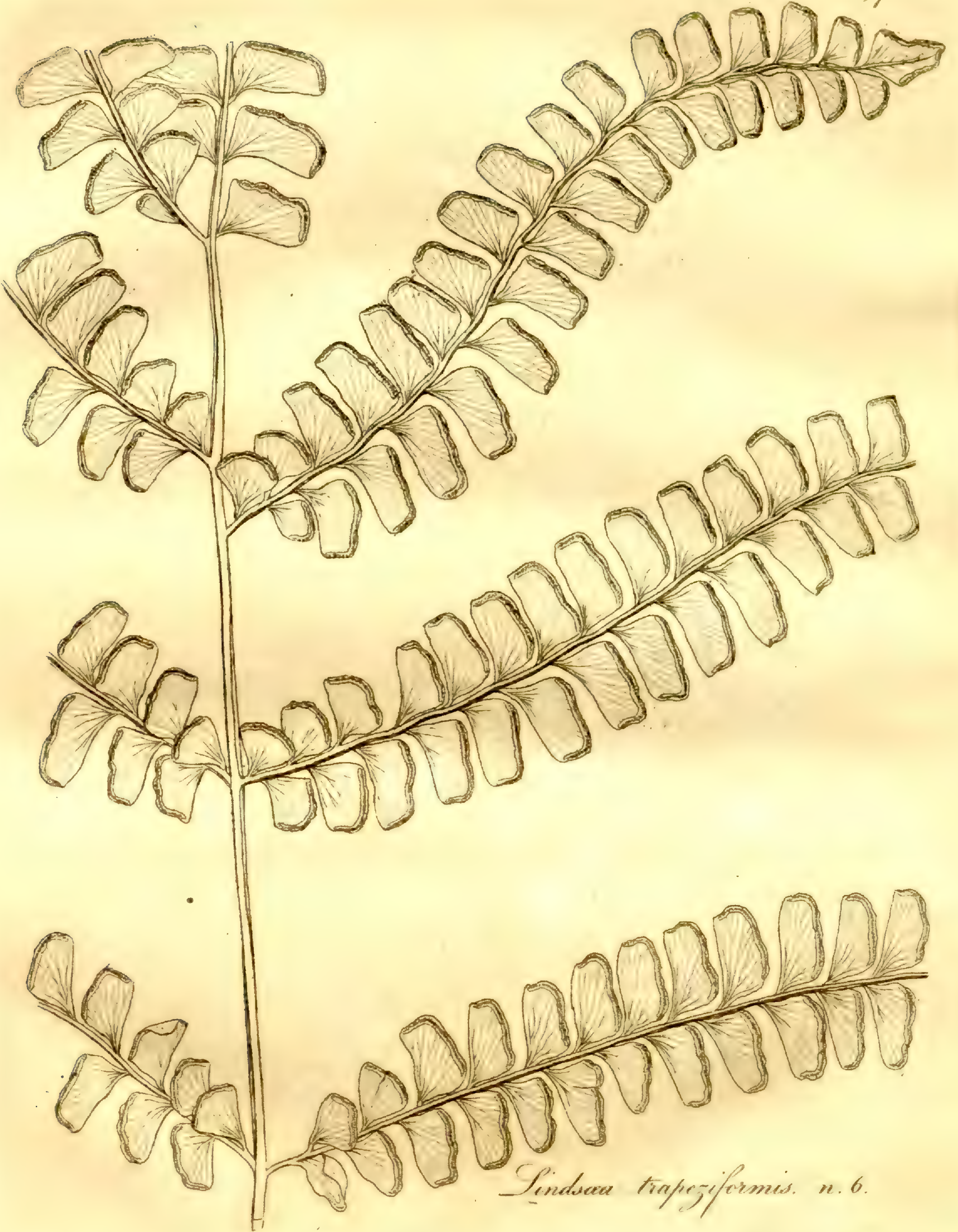
Habitat in Jamaica. *Ol. Swartz.*

Of this species we may expect a figure and description in Professor Swartz's larger work on his new-discovered plants of the West Indies.

10. *LINDSÆA tenera*, fronde tripinnatifida: laciniis obovato-rhombis incis. TAB. 10.



Lindsaea tenera: n. 10.



Lindsaea trapeziformis. n. 6.



Lindsaea trichomanoides n. g.

Habitat in India Orientali. *Missionarii Societatis Unitatis Fratrum.*
Stipites fusci, palmares. *Frons* longitudine stipitis, triangularis.
Pinnæ infimæ bipinnatifidæ; mediæ pinnatæ; ultimæ simplices. *Fructificationes* marginales.

Specimens of all these species are in the herbarium of Sir Joseph Banks.

A D D I T I O N.

In looking over the collections of plants made in the South Sea Islands by Mr. Menzies, I found a fern, which at the first appearance I took for a *Trichomanes*, according to the Linnæan division of ferns, or *Davallia*, in Dr. Smith's arrangement; but, on closer inspection, it evidently belonged to the genus of *Lindsæa*: and to complete my account of this genus, as far as it is hitherto known to me, I take the liberty to add this species, in sending this paper to the press.

9. *LINDSÆA trichomanoïdes*, frondibus bipinnatis: pinnulis lineari-clavatis. TAB. II.
Habitat in Nova Zelandia: Dusky Bay. *Archibald Menzies.*
Radix repens. *Stipites* brunnei, digitales. *Frons* stipite paulo longior, oblonga: *Pinnulæ* infimæ incisæ. *Fructificationes* intra marginem.

In an advanced state of the fructification, the membrane which covers the capsules, sometimes splits into two or three parts, and has then an appearance of *Davallia*; but in the earlier stage of the fructification, the continued membrane of *Lindsæa* is the more evident, as the insertion of it is marked by a brown line across the whole breadth of the pinnula.

April 23, 1796.

XI. *On a Species of Tellina, not described by Linnæus. By William George Maton, A. B. F. L. S.*

Read December 2, 1794.

A SPECIES of *Tellina* which I have lately found, does not appear to have been described, and was probably never seen by Linnæus, nor has it ever been noticed by any English writer on Conchology. A figure, however, of this shell occurs in Gualtieri's *Index Testarum Conchyliorum* (tab. 7, fig. C C); but it has been referred to by Professor Gmelin, in his edition of the *Systema Naturæ* of Linnæus, for *Tellina cornea*, though it evidently differs from the latter in shape, which Linnæus considered as one of the most certain *criteria* whereby species are to be distinguished. Gualtieri mentions the shell to which I allude as "*Musculus fluviatilis, striatus, subflavus, pellucidus*;" which is a very vague and imperfect description, and by no means sufficient to shew in what respect it differs from *T. cornea*. From a view of the specimens which I have the honour to present to the Linnæan Society, and of the figures (37, 38), I hope it may be judged not inaptly described as follows, viz.

Tellina (rivalis) testa oblique subovata transversim fulcata cornei coloris.

Habitat in aquis dulcibus.

Testa magnitudine pisi, rudis, fulcis latioribus, anterieus planiuscula,

cula, cardinis dentibus duriusculis, prominulis. Differt à *T. cornea* cardine versus extremitatem, nec ad medium testæ.

I have generally found *Tellina rivalis* on chalky parts of the bed of the river Avon, and in rivulets communicating with it near Salisbury; but I have never seen it in any considerable abundance, nor have I as yet heard of its being found any where else. There can be little doubt however, that, if diligently sought after, it may be discovered in most rivers and streams which are inhabited by *Tellina cornea*.

TAB. 13, fig. 37, represents the whole shell; 38, one valve, in order to shew the *cardo*, or hinge.

39, 40, represent *Tellina cornea*, in order that its difference from the former may be distinctly seen. These last correspond with *tab. 1, fig. 5*, of Lister's *Appendix An. Angl.* (which is referred to by Linnæus for that species), and with *tab. 7, fig. B. C.* of Gualtieri's *Ind. Test. Conch.*

XII. *Observations upon the Generic Character of Ulva, with Descriptions of some new Species.* By Thomas Jenkinson Woodward, Esq. F. L. S.

Read December 2, 1794.

THE introduction of a new *Alga* from the Mediterranean sea, which in fructification agrees with some of the plants arranged in the genus *ULVA*, but in other particulars by no means accords with the generic character, made it necessary to take a general examination and consideration of the species enumerated by different authors; in order to ascertain whether it might properly be placed amongst them, or must be considered as forming a new genus of itself. The result of this enquiry has been a thorough conviction, that the most extreme anomaly exists amongst the species at present arranged by various authors in this genus; a circumstance which cannot escape the observation of every botanical student, who may undertake the investigation and consideration of the marine plants. Under this impression the present paper has been composed, in which it is proposed to point out the impropriety of the generic character as it now stands, and to offer to the consideration of the members of the *Linnæan Society*, and through them to botanists in general, such a character as may include the different descriptions of plants at present placed in this genus. This is followed by a description of some new species.

The

The genus *Ulva* was adopted by Linnæus from Dillenius, and the character stands in the *Genera Plantarum* in these words—“*Fructificationes in membranâ vesiculari absque fronde.*” In the *Systema Vegetabilium*, the essential character of the genus is thus given—“*Fructificationes in membranâ diaphanâ:*” and this character is adopted by Hudson, Lightfoot, and all the Linnæan authors, notwithstanding a great part of the plants which are arranged in this genus can by no means be considered as agreeing with it. Amongst the species enumerated by Linnæus himself, in the *Species Plantarum*, are some which only agree in part with the generic character, and others which are totally discordant from it. Of the first description are all those species which were adopted from the *Synopsis*, *laetuca*, *latissima*, and the rest, in which no actual fructification has been hitherto discovered; in consequence of which it is there called “*Genus sterile.*” Amongst the latter are *pruniformis* and *granulata*, which are both spherical, and filled with a gelatinous pulp, in which no fructification has as yet been observed. The *Ulva pavonia* is the only one amongst the species enumerated by Linnæus, in which fructification visibly exists; and this, which can scarcely be said to consist of a diaphanous membrane, has by some authors been considered as a *Fucus*, from the circumstance of the seeds being disposed in separate fasciæ, and not dispersed over the whole surface. The *Flora Anglica* includes species which accord still less with the essential character; some being round and fistulose, and amongst these the *fistulosa* is undoubtedly opaque; and others filiform, amongst which it is sufficient to mention *plumosa*, than which nothing can be farther removed from the generic character.

Besides this anomaly, which might be removed by forming one or more new genera; the character is in itself vague and doubtful, as neither the kind, nor the precise situation of the fructification is
pointed

pointed out ; and some of the acknowledged fuci may undoubtedly be considered as having their fructification situated in a diaphanous membrane. Having stated these objections to the present generic character, the following is proposed, not as a perfect one, but as less erroneous, and as better according with the numerous species at present arranged under this genus ; and this principally with a view to induce others who are better qualified, to take the matter into consideration, and at length establish one on such fixed and natural principles as may remain permanent, without need of future revision.

ULVA.

Char. eff. Frons membranacea seu gelatinosa, fructificatio (si adsit) per totam frondem quaquaversim sparsa.

Char. nat. Radix nulla nisi basis frondis paululum explanata.

Frons continua, simplex vel ramosa, membranacea seu gelatinosa.

Fructificatio—granula seu femina per totam frondem sparsa, solitaria vel congesta, intra substantiam vel sub epidermide sita.

The plants belonging to this genus adhere to the submarine rocks and stones, to piles or planks, and not unfrequently to other plants, by an expanded disc, a small bulbiform callus, or an unformed gelatinous lump ; all which are merely the base of the frons somewhat dilated. The frons is either membranaceous or gelatinous ; the former is either plane or tubulous, and usually diaphanous ; the latter either filiform or compressed, solid or fistulous, diaphanous or opaque. Amongst the membranaceous *Ulvæ* some are umbilicated, and have not any visible root, appearing to adhere

to

to their place of growth by some point of the under surface. The greater part are very much attenuated immediately above the base, but suddenly dilate, and are divided into numerous segments, which are always of the same substance throughout. The filiform and compressed *Ulvæ* are either simple or branched; but the branches are merely divisions of the frond, which may therefore strictly be called continuous or uniform. The fructification of these is unknown, excepting only the *Ulva diaphana*, and *rubra* of Hudson; in the former of which it consists of numerous minute grains or seeds, dispersed throughout the whole internal substance: the fructification of the latter has not yet fallen under the observation of the author. Amongst the membranaceous *Ulvæ*, the *pavonia*, *coccinea*, *dichotoma*, *atomaria* and *ligulata*, exhibit a fructification, consisting of numerous minute grains or seeds, thickly scattered on both sides immediately under the epidermis, sometimes crowded, but mostly single. The fructification of the *lactuca*, *latissima*, *compressa*, *umbilicata*, and *laciniata* is entirely unknown.

This genus, and that of *Tremella*, so nearly approach each other, that it is extremely difficult to ascertain their proper limits. The original design appears to have been, to consider such as were membranaceous as *Ulvæ*, and such as were gelatinous as *Tremellæ*: but this distinction has been by no means adhered to; there being gelatinous *Ulvæ*, and membranaceous *Tremellæ*, to be met with in almost every author. Perhaps the best distinction would be, to consider all those which are membranaceous, and in which no visible fructification exists, as belonging to the genus *Tremella*; and to arrange those in which the fructification is known, and such as are filiform, although without any perceptible fructification, with the *Ulvæ*. It must nevertheless be evident, that such an arrangement would entirely subvert the genus *Ulva* as it stands in *Sp. Pl.* and very much

confuse the distribution in *Syst. Veget.* and in the works of other authors. For this reason, it is at present proposed to reject from the genus *Ulva* such species only as are either known to be *Fuci*, or which, from their analogy with those, there are the strongest reasons to conclude must belong to that genus; and also such as are terrestrial and gelatinous, or which grow in fresh water, and are gelatinous, and approaching to a globular form. This will confine the genus *Ulva* to such plants as are really marine, with the single exception of *intestinalis*, which is found in both fresh and salt water, and has so great an affinity with *laëtuca*, *linza*, and *compressa*, that it would be very improper to separate them. For the better distinguishing, and the more easy investigation, of the numerous species, they are here arranged in different subdivisions in the following concise

SYNOPSIS SPECIERUM.

Subd. I. Membranaceæ, fructif. adhuc incognitâ.

A. fronde planâ integrâ.

Ulva umbilicalis. Linn.—Gm. *Syst. Nat.*—Hud.—Light.—With.

purpurea. Gm. *Syst. Nat.*—Roth. *Fl. Germ.*—an var. præced. ?

plicata. Fl. Dan. t. 829.

latissima. Linn.—Gm. *Syst. Nat.*—Light.—With.

fusca. Hud.—à præcedente differt.

lanceolata. Linn.—Gm. *Syst. Nat.*—Hud.—With.

laëtuca. Linn.—Gm. *Syst. Nat.*—Hud.—Light.—With.

B. fronde planâ pertusâ.

Agarum. Gm. *Hist. Fucor.*—Herb. *Bankianum.*

Clathrus. Gm. *Hist. Fucor.*—Herb. *Soc. Linn.*

reticulata. Gm. *Syst. Nat.*—Forsk. *Fl. Ægypt. Arab.*

C. fronde

C. fronde tubulosâ rugosâ.

- Ulva intestinalis.* Linn.—*Gm. Syst. Nat.*—*Hud.*—*Light.*—*With.*
lumbricalis. Linn.—*Gm. Syst. Nat.*
compressa. Linn.—*Gm. Syst. Nat.*—*Hud.*—*Light.*—*With.*
rugosa. Linn.—*Gm. Syst. Nat.*

D. fronde cellulosâ.

- labyrinthiformis.* Linn. *Mant.*—An eadem est labyrinthiformis. *Gm. Syst. Nat.*—*Vandell. Therm.* 120. t. 2. ?

E. fronde plicatâ.

- linza.* Linn.—*Gm. Syst. Nat.*—*Hud.*—*Light.*—*With.* Frons semel longitudinaliter plicata.

Subd. 2. Membranaceæ carpophoræ.

- Ulva pavonia.* Linn.—*Hud.*—*Light.*—*With.*
squamaria. *Gm. Hist. Fucor.*—*Gm. Syst. Nat.* An var. præced. ?
atomaria. *Species nova.*
palmata. *Fucus palmatus* Linn.—*Hud.*—*With.*—*Fructificatio Ulvæ.*
ligulata. *Species nova.*
coccinea. *Hud.*—*With.*
laciniata. *Light.*—*With.*
dichotoma. *Hud.*—*Light.*—*With.*
calendulifolia. *Gm. Syst. Nat.*—*Dill.* 46. t. 9. f. 4.

Subd. 3. Gelatinosæ, fronde tereti s. compressâ, integrâ.

- Ulva rubra.* *Hud.*—*With.*
diaphana. *Hud.*—*With.*

Ulva flavescens. Hud.—*With.* An var. præcedentis?
incrassata. Fl. Dan. 653. An Fucus?
decorticata. Species nova. Subgelatinosa.

Subd. 4. Subgelatinosæ, fronde tereti, tubulosa.

Ulva purpurascens. Hud.—*With.*
fistulosa. Hud.—*With.*
sobolifera. Fl. Dan. 356.
prolifera. Fl. Dan. 763. 1.
spongiformis. Fl. Dan. 763. 2.
Priapus. Gm. Hist. Fucor.—Gm. Syst. Nat. Frons subulata.
glandiformis. Gm. Hist. Fucor.—Gm. Syst. Nat.
plumosa. Hud.—*With.* An Conferva?

Ulva papillofa Murr. Syst. Veget.—filiformis, capillaris & rubens Hud. are either known, or with good reason supposed, to belong to the genus Fucus.

Ulva incrassata Hud.—*crispa*, *cornuta* Gm. Syst. Nat. and Light.—*stellata*, *oryzæformis*, *moccana*, *cuneata* Gm. Syst. Nat.—*pruniformis*, *granulata* Murr. Syst. Veget. and Hud.—and *pisiformis* Reich. Syst. Veget. and Hud. may be considered as more probably belonging to the genus Tremella.

Ulva porrifolia Gm. Syst. Nat. appears to be nothing more than lanceolata repeated.

Ulva Sagarum Gm. Syst. Nat. is Tremella arborea Hud.

Ulva confervoides Gm. Syst. Nat. is Conferva tubulosa Hud.—Dill. t. 6. f. 39. as appears from an original specimen of Dillenius, preserved in the herbarium of Sir Joseph Banks.

Ulva montana Gm. Syst. Nat. quoted from Swartz Nov. pl. gen. et sp. p. 148, belongs to the order Fungi, where it forms a new genus, approaching

approaching Boletus, but without pores, and is not unlike *B. versicolor*. Whether *Ulva montana* *Light.* 973 be the same with this, or to what genus it properly ought to be referred, must be determined by such persons as may have an opportunity of examining it in its native place of growth.

Ulva atomaria—fronde membranaceâ planâ dilatâtâ palmata: segmentis linearibus subramosis subciliatis. *Species nova.*

Radix nulla, nisi basis frondis paululum explanata, superne tomentosa.—Frons brunnea, tenerrima, membranacea, plana, dodrantalis vel semipedalis, à tenui principio orta statim latefcens, et post paululum progressûs in plurimas lacinias divisa. Lacinix lineares, ad originem simplices, dein subramosæ, marginibus nunc integris, nunc ciliis paucis brevibus sursum tendentibus obsitis.—Fructificatio—granula seu semina minutissima, intra utramque frondis paginam sita, et in falciis transversim concentricis congesta.

Inter rejectamenta maris apud Yarmouth, Norfolciæ, invenit D. Wigg.

This elegant plant was found by Mr. Wigg on the beach at Yarmouth, and is supposed to have been washed from the rocks, either at Cromer to the northward, or Harwich to the southward of that place. The substance is membranaceous, extremely thin and delicate; the colour an earthy brown, varying in different specimens, of a lighter or darker shade, but always having a considerable degree of transparency. The height of the largest specimens hitherto found has not exceeded six or seven inches; the breadth about half as much. In some the frond is suddenly dilated
into

into the form of an open fan, and, at an inch or inch and half from the base, is divided into numerous palmated linear segments, either simple or branched; in other specimens, it proceeds three or four inches without being very much increased in breadth, and is then in the same manner divided. The segments are constantly similar in substance to the rest of the frond, and are either entire on the margins, or bordered with a few small cilia pointing upwards. The dilated base, by which the plant adheres to its place of growth, is covered with a thick woolly down; the rest is perfectly smooth. The fructification consists of numerous minute grains or seeds, some of which are single, but the greater part crowded, and disposed in separate fasciæ, forming parallel segments of circles, of which the base of the plant is the centre, and leaving naked spaces between the fasciæ. In this respect it corresponds with *Ulva pavonia*, but differs from that species in its thin and delicate substance, in colour and in form.

Ulva ligulata—frondibus membranaceis planis ramosis, ramis dilatatis subdichotomis ligulatis, angulis dichotomiæ obtusioribus.
Species nova.

Radix callus minimus bulbiformis—Fronde aggregatæ, coccineæ, membranaceæ, subdiaphanæ, dodrantales, vel semipedales—Frons singula à tenuissimo principio orta, modò ad originem modò post paulum progressûs fit ramosa, ramis dilatatis, sæpiùs dichotomis, angulis dichotomiæ obtusioribus, rarissimè trifidis vel quadrifidis.—Ramorum segmenta linearia, dichotoma, apicibus bifidis acutiusculis, ligulis angustis obsita.—Fructificatio granula seu femina minuta intra utramque frondis paginam, necnon in ligulis quaquaversim sparsa solitaria.

Hab. in rupibus et faxis apud Cromer, Norfolciæ.

This beautiful species was found on the beach at Yarmouth by Mr. Wigg, at the same time with the preceding one; but has since been discovered growing on the rocks at Cromer, on the Norfolk coast. It very much resembles some of the varieties of *Fucus ciliatus*, particularly that which is called by Gmelin *ligulatus*, and has doubtless been confounded with it; but the fructification not only proves it to be a very different plant, but also points it out clearly as belonging to the genus *Ulva*. It differs also essentially in never having the ligulated processes, nor any part of the frond armed with cilia. This species varies very much in substance, being sometimes found extremely thin and tender, and at others almost approaching to cartilaginous. The frond most frequently branches directly from the root, and is dichotomously divided throughout; but sometimes it is entire for half its length, and then is divided, in a palmated form, into three or four segments, which are again branched and subdivided. In either case, the segments are always linear, the terminations bifid, and usually acute, and the margins clothed with ligulated processes of the same substance as the rest of the frond. Immediately above the root it is always extremely narrow, proceeding as it were from a point, but is directly dilated, which gives the whole a cuneated form. The fructification consists of minute dark red grains or seeds, always single, but thickly scattered on both sides of the frond.

Ulva decorticata—fronde tereti ramosâ, ramis subdichotomis: apice attenuatis obtusis. *Species nova.*

Radix nulla nisi basis frondis paululum explanata—Frons teres, prope basin ramosa, 6-pedalis et ultra, 4 lineas lata—Rami longissimi, semel vel bis nec ultra dichotomi, ad basin et ad dichotomiam compressi, cæterùm filiformes, apice attenuati obtusi.

—Substantia

—Substantia frondis interna cartilagineo-gelatinosa, undique materie spongiosâ, granulis innumerabilibus minutis congestis repletâ, cooperta. Cortex exterior seu epidermis nulla adest—Color superioris partis viridis, inferioris fordidè albescens.

Hab. in mari Mediterraneo.

A single specimen only of this curious and certainly nondescript *Alga* was received by Mr. Wigg from the Mediterranean, along with some other marine plants; but of the particular place of growth he could obtain no certain information. It had so much the habit and appearance of *Fucus loreus*, that it was at first looked upon as a specimen of that plant, overgrown and spoiled by *Flustra pilosa*. On putting it into water, it lost its compressed, and assumed a round form; and it was then observed that the whole surface was composed of minute granulations, which had, whilst it was dry, given it that roughness of appearance, but which in reality more resembled a woolliness or hairiness than the *Flustra pilosa*. From a careful examination of it in this situation, the above specific character and description were drawn up; and from the very singular circumstance of the exterior granulations appearing entirely naked, and not being covered by any outer coat or epidermis whatever, the trivial name of *decorticata* was given to it. The whole length of this particular specimen is six feet six inches; the breadth of the largest branch, where uncompressed, four lines. There is no appearance of any root, but the base of the frond is expanded, and by this it has evidently adhered to its place of growth. Near the base it is branched into three or four or more parts; one of these is very short; two others are dichotomously divided at about six inches from their origin, after which they continue simple to their terminations. The longest branch, or, as it may be considered, the

the principal frond, after being once divided near the base, continues simple for three feet, when it becomes dichotomous, and these branches then continue undivided to the end. The whole plant is nearly round and filiform, except that the branches are compressed at their origin, and again above and below the angles of their dichotomy. The ends of the branches are attenuated, and terminate obtusely. In substance it differs from all other known marine *Algæ*: the central part is solid and cartilaginous, but at the same time somewhat gelatinous; this is every where surrounded and covered with a spongy mass filled with minute granulations, and entirely destitute of any outer skin; in consequence of which it retains water like a sponge, and the whole surface has a rough and uneven appearance. It may perhaps be objected, that this species does not sufficiently agree with the nat. char. the fructification appearing entirely naked: but although it has that appearance, it is in reality all imbedded in the spongy substance of which the greater part of the frond is composed, but from the want of an epidermis the exterior granulations must necessarily appear to be situated on the surface, and not beneath it. It might also be supposed, that the outer part containing the granulations is parasitical, and formed upon some *fucus* or other plant belonging to the *Algæ*; but, besides that no parasite is ever known so entirely to cover the living plant on which it grows, that no part by which it might be discovered is left naked, the spongy matter containing the granulations so absolutely proceeds from, and forms a part of, the more solid centre, that with the utmost care and attention in dissecting it has not been possible absolutely to separate them, and no doubt can possibly remain of their forming one entire and perfect plant. The central part is green, the rest of the internal substance whitish; of the surface, one half, which is supposed to be what in floating, or when left by the tide, is uppermost, is green, the other part dirty white.

From the very extended length of this plant, it is scarcely possible to give a plate which shall be a sufficiently accurate representation of it; but from its totally dissimilar appearance to every other known species of *Ulva*, and from its similarity in habit to *Fucus loreus*, although it is more branched towards the base, and much more simple upwards than that *Fucus*, it is hoped that the foregoing ample description and history of the plant will be abundantly sufficient to distinguish it, when it shall again be brought under observation.

XIII. *Account of a Species of Bark, the Original Quina-Quina of Peru, sent over by Mons. de la Condamine to Cromwell Mortimer, Esq. Sec. R. Soc. about 1749. Communicated to A. B. Lambert, Esq. F. R. S. V. P. L. S. by John Hawkins, Esq. of Dorchester.*

Read December 4, 1794.

THERE is a famous tree, besides the Peruvian bark (*Cinchona officinalis* of Linnæus), known in several provinces of South America under the name of *Quina-Quina*, and in the province of Maynas on the banks of the river Marannon under that of *Tatchi*. A fragrant resin distills from the trunk by means of an incision. The seeds, called by the Spaniards *Pepitas de Quina-Quina*, have the form of beans, or of flat almonds, and are enclosed in a kind of doubled leaf, between which and the seed is found a little of the same resin that distills from the tree. Their chief use is to make fumigations, which are reputed cordial and wholesome, but their reputation is much less now than formerly.

This tree grows plentifully in several provinces of High Peru, as in the neighbourhood of Chucuisaca or La Plata, Tarija, Misque, Lipes, &c. The natives make rolls or masses of the resin, which they sell at Potosi and Chucuisaca, where they serve not only to fumigate or perfume with, but also for several other uses in physic, sometimes under the form of a plaister, sometimes under that of a compound oil made from the resin. This substance is supposed to

promote perspiration, strengthen the nerves, and to restore the motion of the joints in gouty people, by barely carrying in the hand and continually handling it, without any preparation, of which many instances are recorded. The Turks apply their *Caddarum* to the very same use.

It is wonderful, that the bark of *Loxa* (*Cinchona officinalis*) should have been called in Europe, and every other part of the world except its native place, by the name of *Quina-Quina*, which name properly belongs to the tree we are mentioning, always called *Quina-Quina* by the natives, and afterwards by the Spaniards when they first became acquainted with it. Among the several virtues attributed to this tree, the most considerable is that of its bark, which passed for an excellent febrifuge, and before the discovery of the tree of *Loxa* was in great repute for curing tertian agues, &c. The jesuits of *La Paz* or *Chucuyapu* gathered its bark, which is intensely bitter, very carefully, and used to send it to Rome, where it was distributed under the true name of *Quina-Quina*, and used for the cure of intermittent fevers. It seems that the bark of *Loxa* having passed into Europe, particularly to Rome, by the same means, the new febrifuge has been confounded with the old one, and that of *Loxa* having been most used, has retained the name of the first, which is now-a-days almost entirely forgotten. The name *Cascarilla*, or small bark, given to that of *Loxa*, seems to have been invented in order to distinguish it from some other, undoubtedly the ancient *Quina-Quina*.

TAB. 12 represents the ancient *Quina-Quina* etched by Mr. Hawkins from the original specimen in 1741, and which is here re-engraved, the old plate being lost. The stalk (A) is triangular, furrowed and pithy, emitting branches alternately, with a leafy wing



Quina. Quina.

wing running along every angle, like a three-edged sword-blade, terminating here and there in a rounded form. These wings are thick, and curiously veined. When steeped in hot water, in order to expand them, they became covered all over with a white powdery substance (probably from the resin which the water could not dissolve). (B) is a transverse section of the stem and leaves; (C) the seeds, of a brown colour and woody substance.

XIV. *Natural History of Perca Scandens.* By Lieutenant Daldorff, of Tranquebar. Communicated by Sir Joseph Banks, Bart. K. B. P. R. S. H. M. L. S.

Read January 6, 1795.

PERCA *scandens* (Sennal, Malab.) Nova species fecundæ subdivisionis: dorso monopterygio, cauda indivisa: forsan inferenda pone speciem nonam Syst. Linnæani ex editione decimatercia; aut pone speciem decimam-quintam in editione Systematis Linn. curante Gmelino.

Differentia Specifica.

P. pinnæ dorsalis radiis spinosis septendecim; muticis octo; squamis (scabris) margine denticulato albido.

Descriptio.

Palmaris; mucore tenaci nigro obducta; supra obscure viridis, dein lucidior, subtus pallide aurea.

Os utrimque ante labia denticulatum.

Frons, poris ordinate dispositis; squamis margine albido integro.

Oculi laterales plani; iride nitide aurea; pupilla magna nigra.

Operculum branchiostegum squamosum, subtriphyllum; lobo postico superiore cincto spinis viginti-tribus, intermediis longioribus; inferiore spinis quindecim.

Pinna dorsalis complicata in fossula dorsi absconditur.

Pinnæ pectorales oblongæ obtusæ; radiis duodecim.

Pinnæ ventrales sex-radiatæ, subconnatæ, rubescentes; radio primo spinoso.

Pinna analis in fossulam corporis complicatilis; radiis spinosis decem, muticis octo.

Pinna caudalis subrotundata; radiis septendecim bifidis.

Locus, Tempus ac Mores.

Capta Tranquebariæ circa Id. Novemb. 1791, propriis manibus in rivulo defluente ex *Borassi flabelliformis* fronde in lata corticis fissura. Arbor stagno vicina. Piscis inhærens fissuræ quinque pedes et ultra supra stagnum elatus sub ipsis meis oculis altius ascendere annitebatur. Spinis branchiostegorum expansorum utrinque fissuræ parietes attingentibus suspensus, caudam torquebat sinistrosam; spinulisque pinnæ analis parieti fissuræ adpressis, firmissime illis insistens altius se afferebat per corporis expansionem, branchiostegis corpori applicatis: quibus iterum expansis altius quam antea se in corticis fissura tenebat. Eoque modo spinosos radios pinnæ dorsalis mox ad dextrum mox ad sinistrum latus cortici infigens, continuebat iter, quod meis demum manibus impediabatur. Vita videtur tenacissima: per plures enim horas sub tecto in sicca arena eodem modo quo antea scanderat arborem obambulabat. Operculorum spinæ ab incolis venenatæ existimantur.

XV. *The specific Characters of some minute Shells discovered on the Coast of Pembrokehire, with an Account of a new marine Animal. By John Adams, Esq. F. L. S.*

Read January 6, 1795.

I HAVE the honour to offer to the attention of the Linnæan Society the specific characters of the following minute shells collected in the sea sand on the coast of Pembrokehire, and I believe hitherto unnoticed by our British Conchologists.

ARCA. *Syst. Nat.* 312.

minuta. A. testa subrotunda: striis concentricis, margine integro.
Obs. Color albus.

BUCCINUM. *Syst. Nat.* 33.

breve. 1. B. testa quinque anfractibus: longitudinaliter costatis: transversim striatis.

Obs. Color albus opacus, caudâ brevissimâ.

TAB. 13. *fig.* 3, 4.

minutum. 2. B. tribus anfractibus: longitudinaliter costatis.

Obs. Color albus opacus. *Fig.* 5, 6.

læve. 3. B. testa lævi tribus anfractibus, caudâ elongatâ.

Obs. Color albus opacus; anfractus primus secundo multo ventricosior; apertura ovalis. *Fig.* 7, 8.

obtusissimum.

obtusissimum. 4. B. testa lævi, tribus anfractibus, apertura coarctata, cauda elongata.

Obs. A præcedente differt et in aperturæ forma, et quod anfractus ipsi sunt quam proxime magnitudinis æqualis. *Fig. 9, 10.*

MUREX. *Syst. Nat. 325.*

minutissimus. M. quinque anfractibus spiraliter striatis, costis remotis, canali clauso.

Obs. Testa elegans pellucida.

TROCHUS. *Syst. Nat. 326.*

parvus. T. testa conica imperforata quatuor anfractibus tuberculatis.

Obs. Color albus.

TURBO. *Syst. Nat. 327.*

* imperforati opaci.

nitidus. 1. T. testa lævi quatuor anfractibus, apertura ovali.

Obs. Testa obtusa.

scriptus. 2. T. testa lævi tribus anfractibus, lineis fuscis characteriformibus, apertura subrotunda.

Obs. Istæ lineæ lineis Lichenis scripti omnino similes. *Fig. 11, 12.*

costatus. 3. T. quatuor anfractibus profundè longitudinaliter costatis: transversim striatis, apertura ovali.

Obs. Color albus, apertura marginata, costæ ipsæ nitidissimæ. *Fig. 13, 14.*

subluteus. 4. T. quinque anfractibus longitudinaliter costatis, apertura rotunda marginata. *Fig. 15, 16.*

- albus.* 5. T. quinque anfractibus longitudinaliter costatis, apertura subrotunda.
 Obs. A præcedente differt, quod apertura non marginata est. *Fig. 17, 18.*
- reticulatus.* 6. T. quatuor anfractibus reticulatis, apertura subrotunda.
 Obs. Color albus. *Fig. 19, 20.*
- ruber.* 7. T. testa lævi quinque anfractibus, apertura subrotunda. *Fig. 21, 22.*
 * * imperforati pellucidi.
- interstinctus.* 8. T. testa lævi quinque anfractibus costa tenui interstinctis.
 Obs. Color albus, apertura subrotunda. *Fig. 23, 24.*
- striatus.* 9. T. quinque anfractibus spiraliter striatis, apertura ovali.
 Obs. Color albus. Testa perelegans. *Fig. 25, 26.*
- subarcuatus.* 10. T. decem anfractibus longitudinaliter costatis, testa ad apicem subarcuata.
 Obs. Color albus. *Fig. 27, 28.*
- æreus.* 11. T. sex anfractibus longitudinaliter costatis, apertura subovali.
 Obs. Color inter costas æreus, costæ ipsæ albæ. *Fig. 29, 30.*
- elegans.* 12. T. sex anfractibus spiraliter striatis, costis remotis, apertura ovali. *Fig. 31, 32.*
- pellucidus.* 13. T. quinque anfractibus reticulatis, apertura subrotunda.
 Obs. Color albus. *Fig. 33, 34.*

HELIX. *Syst. Nat.* 328.

tubulatus. 1. H. tribus anfractibus longitudinaliter striatis.

Obs. Singularis hac in specie est constructio, nam testæ, umbilici loco, tubo marginato qui extra testæ superficiem extenditur, instructa est. *Fig.* 35, 36.

variegata. 2. H. testæ lævi quatuor anfractibus, primo ventricosiore, lineis rubris notatis.

Obs. Basi imperforata. Testæ subpellucida, aperturæ margine patentissima.

NERITA. *Syst. Nat.* 329.

pellucida. 1. N. testæ lævi pellucida, anfractibus tribus.

alba. 2. N. testæ lævi subpellucida, duobus anfractibus.

The following Marine Animal appears to constitute a new genus among the *Vermes Zoophyta*.

DERRIS.

GENER. CHAR. *Corpus* teres articulatum; *os* terminale, *tentacula* duo.

sanguinea. D.—TAB. 13. *f.* 1, 2.

Observations.

THIS singular animal is of a cylindrical form, gradually decreasing to the anus, and terminating in an acute point. It is composed of joints, and capable of the greatest flexibility: the body is composed of an external membranaceous transparent coat, that surrounds the internal parts; which are rendered visible by the pellucidness of the covering. The head is extended beyond the outer skin, and

is less than the anterior extremity of the body, to which it is connected by the membranaceous covering of the head forming a neck: on the top are situated two white cylindrical *tentacula*, capable of being elevated or depressed at pleasure: the mouth consists of two lips; the lower one straight and fixed, the upper one hooked and moveable: when the animal is at rest it is open, but is frequently closed with wonderful quickness, probably to secure the animalcula on which it may be presumed to feed.

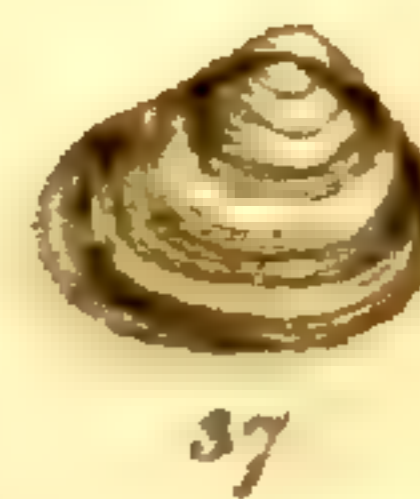
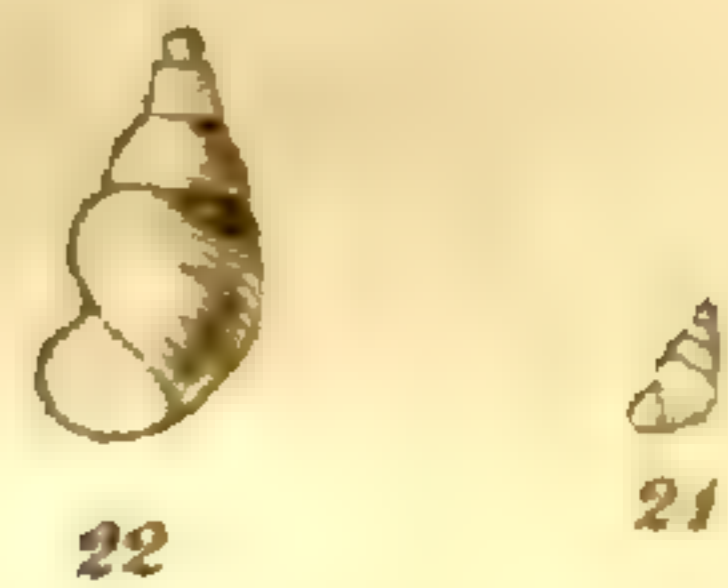
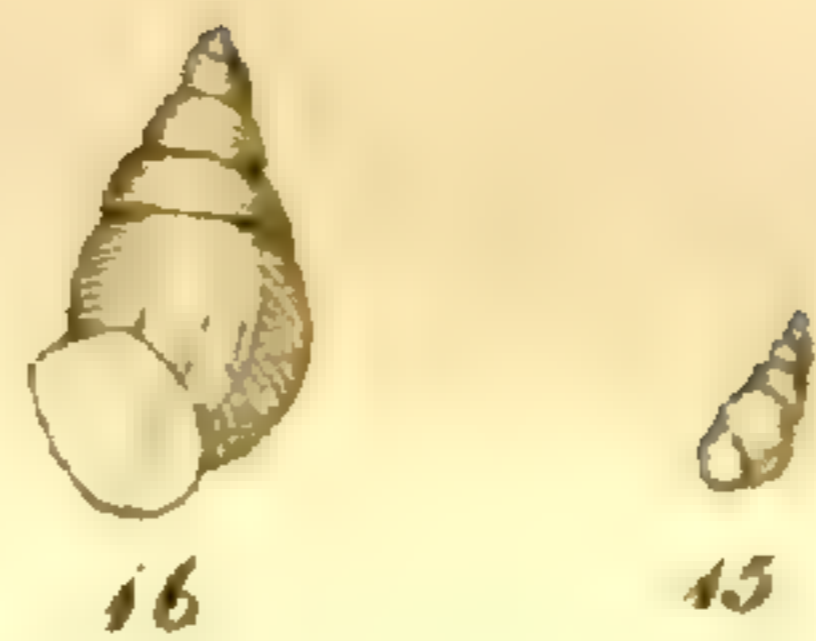
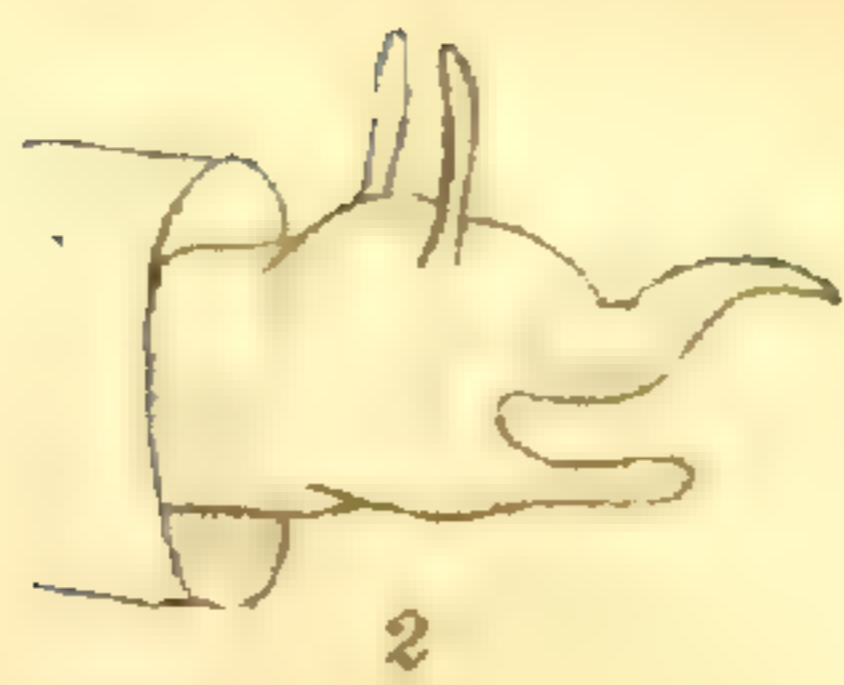
The internal structure is composed of a simple alimentary canal, somewhat larger in the joints; this increase of size in those particular parts originates, as I conceive, in its being attached by transverse processes to the external coat in the articulations, for the purpose of keeping this long intestine steady: a similar contrivance is observable in the genus *Echinus*; it is capable of partial dilatation between the joints only, which is an additional proof of its being fastened there. The animal moves by an undulatory motion of the whole body.

Though the liberality of Sir Joseph Banks has enabled me to consult his extensive collection, I have not been able to meet with any author who has described a marine animal resembling this. In this case it seemed most eligible to make it a distinct genus; to which, from the truly membranaceous substance of this species, I have given the title of *Derris*.

E X P L. OF T A B. 13.

- FIG. 1. *Derris fanguinea* of the natural size.
 2. The head magnified.
 3, 4. *Buccinum breve*.
 5, 6. *Buccinum minutum*.

FIG. 7, 8.



- FIG. 7, 8. Buccinum læve.
9, 10. B. obtusissimum.
11, 12. Turbo scriptus.
13, 14. Turbo costatus.
15, 16. Turbo subluteus.
17, 18. Turbo albus.
19, 20. Turbo reticulatus.
21, 22. Turbo ruber.
23, 24. Turbo interstinctus.
25, 26. Turbo striatus.
27, 28. Turbo sub-arcuatus.
29, 30. Turbo æreus.
31, 32. Turbo elegans.
33, 34. Turbo pellucidus.
35, 36. Helix tubulatus.
37, &c. See page 45.

XVI. *On the Latin Terms used in Natural History.* By the Rev. John Brand, A. M. A. L. S.

Read January 6, 1795.

THE Latin has been adopted as the language of natural history ; but the latinity of the natural historians has undergone no small censure.

By the adoption of the Latin as the common language of the science, in the degree in which it obtains, new discoveries in it are propagated with great facility. Other branches of philosophy have not had the same good fortune ; and every European nation is become philosophical : and thus, as Monf. D'Alembert has observed, he who devotes himself to the cultivation of any one of them, if he would keep his knowledge up to the level of its state, is reduced to the necessity of flinging away a very valuable part of his life, in acquiring seven or eight languages.

But the latinity of the terms in which natural history is written, has been censured : upon this charge the following remarks may be made.

Such terms must be either primitives or derivatives ; now either of these may be *barbarisms*, when not found in any good Latin author ; or *improprieties* (*verba impropria*, *Quint.*), when, although so found, they are not to be found used in the same sense. This must

must be admitted: but it is here contended, that it does not on this account *alone* follow that they are so. This is proved from the practice of the ancient grammarians in the invention of technical terms, in conjunction with the authority of Tully.

First, the use of a Latin primitive or derivative, in a sense in which it does not occur in any pure Roman writer, is not necessarily an impropriety, technically so called; for if a considerable variation from such an established sense were so, the very grammatical terms of the Roman writers would fall under that censure, as for instance (*articulus*) an article, (*verbum*) a verb. When these terms were first used by grammarians, there was a great variation from their pre-established sense, and their primary significations—a joint, a word.

It is likewise certain, that if grammar had not been reduced into an art among the Romans, these terms would not have been now found in their technical senses in their writings. And if a writer of this age, having reduced the art into a system, had presented the world with the first Latin Grammar, and had given the same names, *verbum*, *articulus*, to the same things, his offence against pure latinity, or the pre-established good use of those words, would have been of the same magnitude as that of the original Latin grammarians, and no more; the same innovations in a language, living or dead, being of equal quality: yet the charge against the propriety of the terms used by such a writer, would be the same in kind as that brought against the natural historians; but it must have fallen to the ground—nor would it have been in degree less strong; for bolder extensions in the sense of Latin terms, are not, that I recollect, to be found in the Lexicon of our technical language. These fastidious grammatical exceptions are, in principle, exceptions both to the art and the philosophy of grammar. If the naturalists err in this point, they err with the grammatical fathers (*cum patribus*).

Secondly, What I have to say about derivatives not used in Latin writers, will be contained in a short comment on a passage in the Academic Questions of Cicero, where he asserts the rights and privileges of those who treat on philosophical subjects in a language not yet enriched with proper terms, and exemplifies his principles in the formation of a new derivative, an authority from which I apprehend no appeal will be made. The translation of this passage is as follows. The original is placed at the end of this article*.

Varro. ‘ You will allow me the same liberty which has always
‘ been assumed by the Greeks, who have long pursued these re-
‘ searches; that *to unusual subjects I may apply terms which never have*
‘ *been in use.*

Atticus. ‘ Certainly: but if our Latin language will not fur-
‘ nish them, *you may have recourse to the Greek.*

Varro. ‘ I am obliged to you; but I will endeavour to express
‘ myself in Latin, confining myself to such terms of Greek deriva-
‘ tion as are already naturalized among us, as philosophy, rhetoric,
‘ physics, dialectics. I have therefore formed the new term *Qualitas*,
‘ to express the sense of the Greek word Ποιότης; which even among
‘ them is not a word of common use, but confined to the philoso-
‘ phers. In like manner, none of the terms of the logicians are
‘ found in the popular language; and the same is true of the terms
‘ of almost all the arts: *to new things new names must be given, or*
‘ *those of others transferred to them.* If the Greeks take this liberty,
‘ who have cultivated the sciences for ages, *how much stronger is the*
‘ *reason it should be granted to us, in our first attempt to treat upon them!*

Cicero. ‘ It seems to me, that you will do a work of utility to the
‘ public, if you not only increase the stock of our ideas, which you have al-
‘ ready done, but also that of our words.

Varro.

Varro. ‘ We shall therefore hazard the use of new words when necessary, and by your authority.’

And where the same necessity, arising from the same source, exists, the same liberty is to be taken. And as Cicero, on this point, is an unexceptionable authority, let us examine his practice, to see to what degree it may be carried. The word *Qualitas*, derived from *Quale*, is now familiarized to the ear. The first boldness of this derivative is only perceived by reflection; but its degree will strike us more immediately, if we take the English words *what*, or *such* (as), which answer to the Latin pronominal adjective *Quale*, and add one of the substantive terminations [hood] or [ness] to either, to make a philosophical term of it. I ask the severe grammarians, who protest against the class of new derivatives in the philosophical language of Linnæus, to produce among them a bolder example of the creation of a new term.

And by the same authority, we may defend his imposing new significations on old words; for in a few lines after the conclusion of the extract, there occurs a liberty of this kind, and as remarkable as the former; for Cicero there gives a new sense to the pronominal adjective *Quale*, in correspondence to that of his new derivative *Qualitas*; using it substantively to signify any being or thing, as compounded of substance and accident, or matter and qualities: “ Et ita effeci quæ appellant qualia; e quibus in omni natura co-
“ hærente, et continuata cum omnibus suis partibus, effectum esse
“ mundum.”

It deserves to be remarked respecting these innovations, that this assertion of the legitimacy of the practice in all like cases is here put by Cicero into the mouth of Varro, the greatest critic and grammarian of the Augustan age; who wrote on the Latin language, and addressed his works to Cicero himself.

Hence it appears, that philosophy is not restrained to the use of the common terms of any language; nor, for the same reason, to those of the historians, orators, dramatic writers, poets, &c. of that language, either separately or conjointly: but, as every art has terms of its own, so has every branch of science.

That he who enriches any science with a number of new discoveries, confers a second general benefit, by enriching the language in which he treats of them, by all such terms as shall be requisite to do it in the best manner.

Cicero, repeating his new term *quality*, adds with great philosophical pleasantry, “*Faciamus tractando usitatus hoc verbum, et tritius.*” And it may be said of the terms of natural history, that our elegant classical scholars will find their asperities wear off very soon, if, by adding to their former acquisitions a knowledge of this new philosophy, they make themselves practically versed in the use of them. There may remain some precisely descriptive, which may be yet added; some reformation may be wanted in those which may have been hastily adopted; and from them we may expect it.

It is to be observed, that these arguments defend the liberty, not the licentiousness, of introducing new terms; and defend it upon the footing of necessity only; and therefore extend that liberty no further than such necessity actually extends.

I had thought to have finished here; but having made so much use of the authority of the great ornament of the Roman forum; the sentiments of the elegant expositor of our own laws on this subject are not to be passed by. These, with a minute change to avoid the introduction of fresh matter, are as follows: “This is a
 “ technical language calculated for eternal duration, and easy to be
 “ apprehended both in present and future times; and on these ac-
 “ counts best suited to preserve those memorials which are intended
 “ to

“ to perpetuate [*every discovery in natural history*]. It is true indeed,
 “ that many of the terms of art with which it abounds, may, as
 “ Mr. Selden observes, give offence to some grammatical and
 “ squeamish stomachs, who would rather choose to live in igno-
 “ rance of things most useful and important, than to have their
 “ delicate ears wounded by the use of a word unknown to Cicero,
 “ Sallust, or the other writers of the Augustan age §.”

* Cic. Op. omnia, Gronovii. Acad. Quest. L. I.

24. *** Dabitur enim profectò, ut in *rebus inusitatis*, quod Græci ipsi faciunt, a quibus hæc jamdiu tractantur, *utamur verbis interdum inauditis*.

25. Nos verò, inquit Atticus. *Quin etiam Græcis licebit utare, cum voles, si te Latina forte deficient*. Bene fanè facis: sed enitar ut Latinè loquar, nisi in hujus modi verbis, ut philosophiam, aut rhetoricam, aut physicam, aut dialecticam appellem, quibus, ut aliis multis, consuetudo jam utitur pro Latinis. Qualitates igitur appellavi, quas *ποιότητες* Græci vocant: quod ipsum apud Græcos non est vulgi verbum, sed philosophorum, atque id in multis. Dialecticorum vero verba nulla sunt publica; suis utuntur. Et id quidem commune omnium ferè est artium. Aut enim nova sunt rerum novarum facienda nomina, aut ex aliis transferenda, *quod si Græci faciunt, qui in iis rebus tot jam sæcula versantur, quanto id magis nobis concedendum est, qui hæc nunc primum tractare conamur?*

26. Tu verò, inquam, Varro, bene etiam meriturus mihi vide-
 ris, de tuis civibus, *si eos non modo copia rerum auxeris ut effecisti, sed etiam verborum*. Audebimus ergo, inquit, novis verbis uti, te auctore. * *

§ Blackstone's Commentaries, book iii. ch. 21.

XVII. *Additional Observations on the British Species of Carex.* By the
 Rev. Samuel Goodenough, LL. D. F. R. S. Tr. L. S.

Read January 6, 1795.

IT was not to be expected that, in treating on this subject, I could at once collect every article of information necessary to be mentioned, or that I could be aware of all the minute variations which take place from soil, from situation, and from climate, in such a variable genus as *Carex* is. In my former paper * I endeavoured to notice as many of these as I could without being troublesome from unreasonable minuteness.

Some general perplexities of this sort will present themselves to all accurate observers,—such as respect the length of the foliaceous *bractææ*, which are scarcely in any one species absolutely constant—the appearance of male flowers in the female spikes—the proportion of the peduncle of the female spikes, which in some species is for the most part sessile, and yet at times is found of very considerable length, as happens particularly in *C. flava*,—and the division of the capsules at the summit, which in many species are for the most part closed, and yet not unfrequently are found divided:—all these matters must be submitted to the taste and judgment of naturalists, who may be disposed to study the subject with candour. I have stated *axillaris* as having the capsule divided at the summit,

* Linn. Transf. vol. ii. p. 126.

and *remota*, as having it entire; but this is not constant. I believe all *Carices* dispose of their seeds by the opening of the point of their capsule. This opening is observable in some very early, in others not till quite old. In the former, the capsule is described as opening; in the latter, because it is not seen but in very advanced age, it is mentioned as closed.

When I inserted *C. fulva* as a distinct species, I did it in consequence of a variety of specimens sent me by my friend Mr. Williams; all of which being nearly the same as that represented in the figure given in my former paper, and entirely corresponding with my foreign specimens, all of the same growth and form, I concluded that I had nothing further to discover. Mr. Williams has since that sent me specimens of more forward growth, which prove it to be a variety of *C. flava*. In the figure of my former paper, it is represented with three female spikes; it very seldom has more than two. I would wish therefore to correct the article of *C. fulva*, and make it a variety of *C. flava*.

C. flava—Var. β , spicis foemineis duabus.

In my former paper, p. 209, I spoke very indeterminately about a *Carex* given me by the late Rev. Mr. Lightfoot. All the spikes in those specimens being androgynous, I imagined them to be *axillaris*: however, my friend Mr. Pitchford of Norwich has lately sent me specimens of more complete growth, and I am now convinced that they belong to *C. extensa*. Mr. Pitchford acquaints me, that they were found by the Rev. Mr. Bryant, near Cley, in Norfolk, in very dry sandy ground. He tells me, that Mr. Bryant sent specimens to Mr. Lightfoot; most probably, therefore, those which I received from him were sent him by Mr. Bryant. I understood at the time, that Mr. Lightfoot had found them in Scotland; but as I had no intention of writing upon the subject, it is very possible that I was
not

not so accurate as I ought to have been in ascertaining its place of growth.

The specimens of *C. extensa* which I found grew in wet places; were large, and very decidedly of the order *spicis sexu distinctis*. Those sent me by Mr. Pitchford, from their dry situation, are from two to nine inches high; some have no male spike at all, and some have the male spike with a few female flowers at the base; but the capsules and the squamæ retain their characteristic form.

I have the pleasure of adding another hitherto unknown species to my division,

Spicis sexu distinctis: Masculâ unicâ: bracteis foliaceis & plerumque vaginantibus.

38. CAREX PULLA. TAB. 14.

C. Digyna, vaginis nullis, spicis ovatis, inferiori pedunculatâ, capsulis ovatis mucronatis, mucrone bifurco.

Habitat in montibus Scotiis. *D. Dickson.*

Radix crassa repens. *Folia* angusta erectiuscula ad margines carinamque aspera, culmo plerumque breviora, modo æquant, interdum exsuperant. *Culmus* suberectus circiter dodrantalis, triqueter, angulis acutis scabriusculis. *Spicæ*, una mascula, duæ foemineæ remotæ. Spica mascula terminalis oblonga femuncialis fulva, squamis oblongo-ovatis acutiusculis, nervo obsoletiusculo. Spica foeminea superior sub-fessilis subrotunda, bracteâ brevi membranaceâ aphyllâ nigrâ, ovatâ acutâ nervo dorsali viridi; inferior sub-ovalis pedunculata, pedunculo tenui spicâ suâ longiori. Ad basin pedunculi, bractea foliacea, culmo brevior vix ac ne vix pedunculum amplectens, utrinque ad basin auriculata, auriculâ parvâ subrotundâ. Squamæ ut in



C. pulla

spicâ masculâ, sed nigricantes, capsulis paulo breviores. *Capsulæ* glabræ ovatæ inflatiusculæ compressiusculæ obtusæ mucronatæ, mucrone brevi furcato, mox nigræ. *Filamenta* ut in cæteris. *Stylus* stigmatibus duobus crassiusculis villosis.

Obs. Variat spicis duabus, unâ masculâ, alterâ foemineâ. Est ubi duæ spicæ masculæ occurrunt. Interdum spica terminalis androgyna evadit.

My catalogue of the British species of *Carex* is enriched with this valuable plant through the active spirit of Mr. Dickson. Its having flowers with only two styles, at once unites it with *Cæspitosa*, *stricta* & *rigida*; but its lowermost spike having a long peduncle, and the capsules being mucronated, with a point bifid and somewhat forked, keep it distinct from either of them. When it has only one female spike, it falls in very readily with the Linnean description of *C. globularis*. But that species is taller and slenderer, and besides has rough villous capsules—this perfectly smooth; a mark of the most decisive discrimination.

The specimens of various new plants, and especially of cryptogamous ones discovered in Scotland, either by Mr. Dickson personally, or by persons incited by him, give us well-grounded hopes, that the present laudable spirit of research in that country will in its progress bring still new subjects to light; a circumstance at all times redounding to the honour of any country and any discoverer.

My friend Mr. Davies has informed me, that *Carex filiformis* is to be met with in the Isle of Anglesea, in the parish of Landegfan, on a swampy spot, lying S. W. of Park Pool.

C. muricata, var. β , which perhaps is not a common plant, grows near Eaton, in Shropshire, in the banks of the driest ditches, as I am informed by my friend Mr. Williams. So singular a habitation deserves notice. Var. α always prefers moist meadows.

XVIII. *A Description of the Porbeagle Shark, the Squalus Cornubicus of Gmelin, Var. α.* By the Rev. Samuel Goodenough, LL. D. F. R. S. Tr. L. S.

Read February 3, 1795.

MR. Pennant, whose zoological labours will ever be considered as a prime ornament to the science of Natural History as well as his native country, professes to have had no opportunity of seeing this species of *Squalus*. We lament that such copious and elaborate works should ever be defective in any respect; yet, whoever has turned his thoughts to such compositions, must be sensible that deficiencies are unavoidable. To complain of such omissions marks the Pseudo-naturalist. Instead of noting what has not been done, the grateful mind of a true naturalist receives with thankfulness what is collected for his information; he is anxious to supply little defects, and feels a laudable pride in making use of the opportunity. I am induced from motives of this kind, to lay before our society the description of the *Porbeagle Shark*.

During my stay at Hastings in the month of September 1793, the fishermen brought this animal to shore. My friend the Rev. Mr. Whitear (to the ingenuity of whose son, Mr. William Whitear, I am indebted for the drawing of its figure, which is executed with great exactness), happening to be at the sea-side at the time, secured
it

it for my inspection. It had been landed about four hours when I first saw it. It weighed twenty-six pounds.

The length of the body, from the tip of the nose to the extremity of the tail, was three feet ten inches. The colour of the body was a deep blue on the back, and white or silvery underneath. The shape was round, except for about six inches from the tail, where it was depressed. At about one inch from the tail was a semicircular or lunar fossule or impression, the points towards the tail. Where the body was depressed, the sides were raised into a sharp angle or elevated line. This line was about eight inches long, and ran out into the middle of the tail, or something more.

The nose was projecting and sharp. On either side from the nose to the eyes, were numerous minute perforations or pores. The eyes were placed four inches from the point of the nose, and were upon an exact level with the surface of the body. They were an inch in diameter, the pupil black, the irides white. Five inches and a half behind the eyes were five gills (*spiracula*) placed in a regular series; the apertures were perpendicular, and about three inches long: they occupied a space of nearly three inches and a half.

Immediately behind the gills were the pectoral fins, which were eight inches long, and behind of a semilunar form. Six inches behind the pectoral fins, the ventral were placed; they were three inches three quarters long, and behind also semilunar. Between the ventral fins was a longitudinal aperture nearly three inches long. *Intra fissuram utrinque mammilla brevis carnosae s. cartilagineae.* Four inches behind the ventral fins the anal appeared, one inch seven eighths long. It was placed vertically, behind semilunar. The base of the tail was four inches from the anal fin. The tail was of a lunar form, vertical, the upper lobe nearly one third longer than the lower.

Of the dorsal fins, the first was fifteen inches and three quarters from the point of the nose; it stood erect, four inches and a half high, and five and a half long. The second was twelve inches behind this, of the same length and size as the anal, to which it stood nearly opposite.

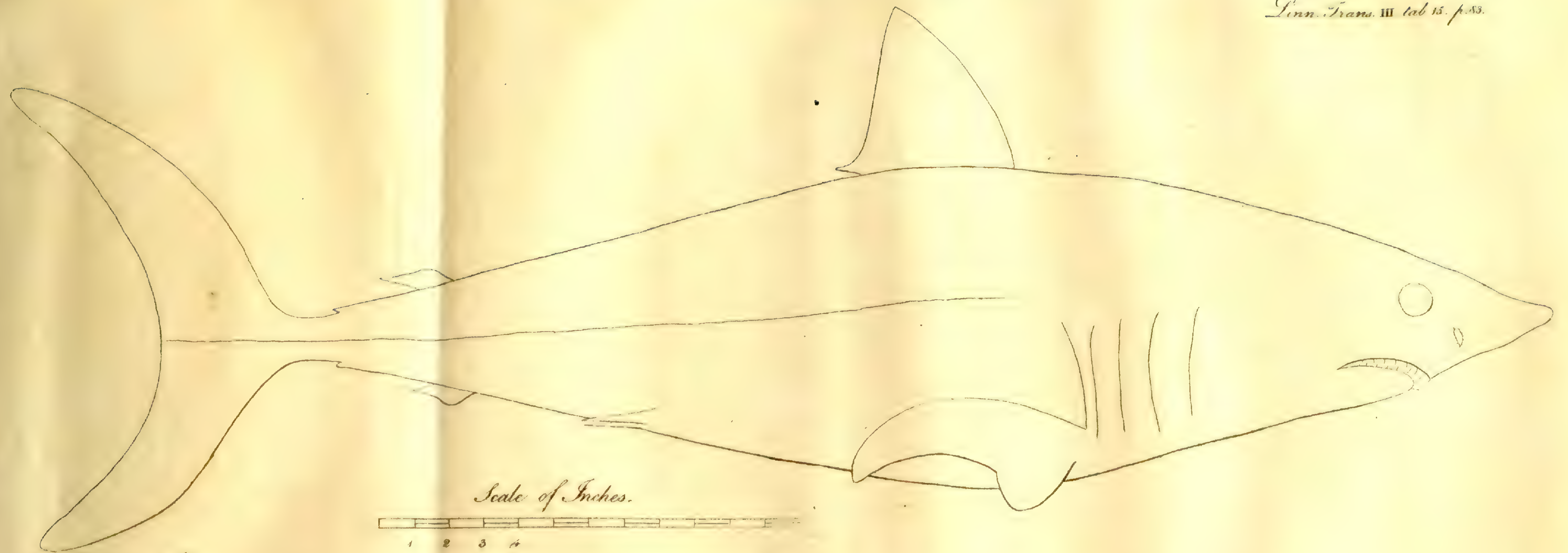
The skin, when stroked backwards, was a little roughish, and an obsolete line of minute tubercles ran from the head down the sides, and at length ended in the thick elevated ridge, which took place at the depression of the body near the tail.

We have been hitherto speaking of the fins and the upper side of the body.

On the under side, from the point of the nose to the nostrils, were numerous minute pores or perforations. The nostrils were three inches from the point of the nose, of a lunar form, the extremities pointing towards the tail. At an inch and one eighth from the nostrils, was the highest part of the curvature of the mouth. The mouth was semicircular, about five inches wide. The upper jaw had two rows of teeth, except in the front, where the two middle ones stood single. The under jaw had two rows also, except in the front, where the two middle teeth had a triple row. The inward row was bent inwards, the others all turned outward. The teeth were white, very sharp, smooth, two-edged, with a little acute process at the base on either side. This process in many lay concealed within the gums. The tongue was white, very short and cartilagineous.

All the fins were blueish before and whitish behind; they were also all of a firm texture, very strong, cartilagineous, and to all appearance, for I did not dissect them, without bone or nerve.

The genus of *Squalus* is not well known, owing to the very imperfect descriptions which we have of them; this has induced me



Scale of Inches.



W Whitaker del.^t

me to be so very particular in my account of this species. If I am wrong in supposing it the *Porbeagle* of Mr. Pennant, I can answer for the exactness of the description. It cannot be the *Beaumaris Shark*, because Mr. Davies (upon whose consummate accuracy any one may implicitly rely) describes it with a blunt nose; this has a sharp one. Upon what authority Gmelin joins the *Porbeagle* and *Beaumaris* sharks as one species, I do not pretend to know. Perhaps it would be advisable that those who have opportunities should examine them very minutely. Gmelin describes it as having a fold or plait (*plica*) on each side of the tail. In the present species there was a strong elevated line or ridge, but nothing of a plait.

From the rows of the teeth, the fishermen who caught it judged it to be two years old. My friend Mr. Whitear told me, that he has seen them eight feet long, with a triple row of teeth.

There was nothing in the stomach.

The essential character of this species may be expressed as follows:

S. corpore tereti antice acuto caudam versus depresso et utrinque angulato.

TAB. 15 represents an outline of the *Squalus Cornubicus*, one fourth of its natural size.

XIX. *Observations on the British Fuci, with particular Descriptions of each Species.* By the Rev. Samuel Goodenough, LL. D. F. R. S. Tr. L. S. and Thomas Jenkinson Woodward, Esq. LL. B. F. L. S.

Read April 7, 1795.

GMELIN, professor of botany in the Imperial Academy at Peterburg, and nephew to the celebrated author of *Flora Sibirica*, was the first who wrote professedly upon the history of *Fuci*. His work appeared in 1768. It will ever bear testimony to his zeal for the cause of natural history, and to his abilities. In his most elaborate *Historia generalis* he has mentioned almost every scientific remark that had been made before his time. We have, in due order, his descriptions of the root, the fructification, his *negative* generic character, the theory of the immortal Reaumur, with his remarks upon the insufficiency of it. Nor does he pass over unnoticed the philosophical disquisitions on the cause and origin of plants, and their variation in growth; every where adding his own accounts of what he has actually observed. If he errs any where in his ideas, still his observations, being all practical, are truly valuable. Naturalists cannot keep too closely in mind the value of actual observation and accurate record; for all memorabilia of this kind being once set forth, remain, let systems vary as they may, instructive to the end of time. The natural figures of a *Brunsfellius* will illustrate their

their subjects in all ages, and an Aristotle's description of the *Chameleon* will delineate this curious animal to the most distant period.

Gmelin's general history is closed with chemical accounts, and experiments made upon several of the *Fuci*. None of these matters need be retailed by us; we only mention the subjects treated of, and possibly may refer to some few of them as we proceed. Our more immediate business is with his method of arrangement; for perhaps it would add something to the knowledge of a subject, were each succeeding systematist to give his reasons, why he accedes to systems established before him, or why he leaves them.

It is impossible to follow Gmelin in his arrangement of either the genera of which he treats, or the orders under which he classes them. In the first place, because there is, as must be confessed, great and almost total ignorance of the fructification of submarine plants, he discards all idea of taking any generic character from that interesting circumstance. We think however, and hope when we treat upon that point that we shall shew, that there is sufficiently *apparent* difference of character in the fructification to accomplish all that we want, viz. generic characters for *Fucus*, *Ulva*, and *Conferva*.

In consequence of rejecting all idea of fructification for his generic character, Gmelin has fallen into the greatest mistakes; the Linnæan genera, *Fucus*, *Ulva*, and *Tremella* are all denominated *Fuci*; and had he had time to have completed his design, he would have added to this group *Byffus* and *Conferva*.

He does not appear to us to be more happy in his disposition of the divisions of his genus. To constitute these, he is perpetually resorting to the fructification. In many instances he does not attempt any modification of character, but actually gives as it were new generic characters to his divisions. In his division *membranacei*, he
says,

says, *Fruētificatio, Proles frondium deciduæ* *. In his division *penicilliferi*, of which *Gaërtnera*, Mr. Hudson's *pedunculatus* as we suppose, stands as the pattern and authority, he makes the growth of a little green *Conserua* upon the tubercles to be the description of the division: we have seen specimens quite free from it. Observations of the same sort might be made upon the others; but one thing alone precludes all acceptation of his method; which is, that he admits plants into these very nice discriminations of division established by the fructification, of whose fructification he professes himself entirely ignorant. Lastly, he has not given any specific characters; which makes the investigation extremely laborious.

His descriptions in general are very faithfully attended to, but his synonyms are seldom to be depended upon. He was not assured even of the Linnæan species, as may be proved, among many other instances, from his mistaking *F. ceranoides*. It is a work however of great merit, and absolutely necessary to every one who would wish to study the subject. We trust our marking these de-

* Gmelin, observing in some of our plants of the division *Fronde planâ aveniâ*, a prolific tendency, and taking it for granted, that those plants produced no seeds because he had observed none, but that the sole mode of propagation consisted in these rudiments of plants falling off, attaching themselves to other bodies, and thus becoming new plants, because he had seen a probability of this process in some; at once rashly adopted Adanson's unphilosophical idea, that some plants were unisexual, that is, produced flowers of one sex (female) only (such are all the *Fuci* which bear tubercles); and that the others were asexual, that is, were merely prolific, and had no flowers at all of either sex:—ideas and terms, though followed by the great names of Gmelin and Gaërtner, yet in our judgment quite unworthy of any thing that deserves the name of philosophy.

Since writing our preface, we have seen Major Velley's elegant and ingenious publication on marine plants; where, among a variety of curious observations, he very properly exposes the futility of Gaërtner's remarks upon the fructification of *Conserua*; an idea which we hope to be able to pursue when we treat of that genus.

fects will not be imputed to any promptitude in us to find fault, but to a desire to save the trouble, and prevent the errors, of the young botanist, who might otherwise be misled by placing too implicit a confidence in an author of so highly established a reputation.

We need not dwell long upon the labours of the older botanists. Morison, in *Hist. Oxon.* v. iii. p. 644, gives a very elegant account of his ideas of the manner in which the several plants are propagated. But there are very few descriptions added to his nomenclature: whence we are often obliged to have recourse to his synonyms to ascertain his meaning; a circumstance at all times, unless a figure accompany it, extremely precarious. He gives no generic character, and his orders are quite void of precise determination. He has collected a great many species, and his figures are in general very expressive.

Nothing can well be more vague than Mr. Ray's generic character of *Fucus*. It would apply in some measure to any thing or every thing submarine. He very often gives very striking descriptions—but his last division, *Foliis vel leviter compressis vel teretibus*, is too loosely given. It must nevertheless be allowed, that his divisions are the most satisfactory except those of Mr. Hudson.

Linnæus, in his *Sp. Pl.* published at Vienna 1764, arranged the *Fuci* under the following divisions:

1. *Dichotomi* { *frondescentes*
 { *caulescentes*

2. *Ramosi* { *foliis distinctis*
 { *fronde unitâ*

3. *Fructificationibus non vesicariis.*

There cannot be a more faulty passage pointed out in the whole circle

circle of that great man's writings: this is the more surprising, as, almost in every particle, of arrangement and system, he shines among his competitors

“ ——— *velut inter ignes*
Luna minores.”

Such an impoverished arrangement probably prevented Professor Murray and other editors of his works from attempting any.

Nothing can be more confused than Mr. Lightfoot's method—No order is observed. He seems to have described his plants almost as they severally came to hand. All his descriptions and figures are excellent; but a regard to truth obliges us to remark, that in many of his descriptions he has borrowed very freely from Gmelin, and that without any acknowledgment whatsoever.

To the praise of the late Mr. Hudson be it mentioned, that he was the first who struck out a true *lucidus ordo*. All his divisions are taken from one and the same source, viz. the different habit and formation of the frond. We have no doubt but that all the *Fuci* of the known world might be classed after his method—a method capable of the most extensive amplification. It is needless to repeat it here, as it is in every body's hands. If we make any alteration in his disposition, it will be little more than to change the words of his division *fronde unitâ* into *foliis unitis*, a more intelligible term; and to introduce a new division in perfect consonance with the neatness of his arrangement—namely, *Fronde hinc canaliculatâ*: for some of the plants which we shall place under this division but ill accord with the character *Fronde planâ aveniâ*, under which they were before arranged. It would have shortened our labour extremely, could we have followed Mr. Hudson in his essential characters; but so much new light has been thrown upon the sub-

ject in consequence of Dr. Smith's most fortunate purchase of the Linnæan Museum, then so many errors in the nomenclature have been discovered, such misconceptions of Linnæus's designation, and so many new species found since Mr. Hudson wrote, that it was in our judgment better to begin *de novo*, and to lay the whole before our Society, drawn up afresh, and containing complete descriptions taken from the plants themselves.

The fructification of the *Algæ*, particularly of those called *aquaticæ*, is the *opprobrium botanicorum*, and indeed seems likely to continue so. It may be asked, what advance has been made in the knowledge of this particular tribe by any modern?—Morison's observation furnished him with almost as much knowledge of the subject as is likely to be obtained, till a Hedwig shall undertake to illustrate these plants also. Morison's words are, 'If any one asserts that the *Algæ* are produced from seed, or something analogous to it, I do not contradict him; for in some plants there seems something thick and tuberosè, adhering to the leaves themselves; in others there appear small vessels distinct from the leaves and the other parts, which however do not contain seeds dry and hardened like those of land plants: but it is probable that a viscus and viscid humour (if it be merely a humour) is produced in them endued with a feminal power, which dropping out of its own accord, or washed out by the agitation of the sea, is carried here and there, and is disseminated; and then by virtue of its mucilage sticks to rocks, stones, shells, and calcareous substances with which it may meet, and, having found a proper receptacle, unfolds the image of the future plant.' Perhaps glasses were not so much used in Morison's time as at present, otherwise he would have observed seeds in those thick and tuberosè parts which he mentions. Gmelin and Reaumur, who hazarded the most decided

opinion concerning the fructification of certain of the *Fuci*, entertained ideas of the generation of these plants nearly corresponding with those of Morison : but, aided by the better assistance of good glasses, they more accurately observed the tubercles ; and Reaumur dissected these tubercles, and found them to be capsules replete with minute seeds.

Reaumur was the author who first asserted that the *Algæ*, or at least a part of them, were monœcious ; for, observing the surface of some of these plants very minutely, he remarked, in the *Fucus ferratus* more particularly, and in a few others, little clusters of filaments, extremely tender and short, in the little dots which are apparent on each side of the nerve which runs through all the branches. Unable to account for such an appearance, and wishing to establish his favourite hypothesis, at the expence of numberless perplexities and contradictions, to which he could oppose little better than surmises and imaginations, he pronounced them to be male flowers. Gmelin very properly takes up the argument against him ; and shewing how very few plants exhibited these filaments, and then arguing from their total defect of *antheræ* (absolutely necessary were analogy to be resorted to), and their distance in all, except in *Fucus elongatus* (our *loreus*), from the female flowers (though it must be allowed that this argument is very far from a good one), he ridicules the whole idea—at the same time suggesting another full as improbable, if not more so, that these minute threads are organs of nutrition. All these ideas must, however, be left to the development of future naturalists. The advantage to be derived from Reaumur (for we would preclude no future investigation even on the same ground) is, that he described exactly what he saw, and delineated the parts of which he spoke, with consummate accuracy. We have the fact stated exactly ; the argument to be drawn from it, depends.

depends upon the judgments of the various botanists who shall read and study his observations. See his plate of *F. serratus* in *Act. Paris.* 1772, part 2d, pl. 3, f. 5 and 9.

Cryptogamic investigation was not Linnæus's excellence—the truth of this appears no where more than in the *Algæ aquaticæ*. In the synoptic table of *Syst. Naturæ* at the head of his class *Cryptogamia* he describes them—

<i>Tremella</i>	—	<i>A. gelatinosa</i>
<i>Ulva</i>	—	<i>A. membranacea</i>
<i>Fucus</i>	—	<i>A. coriacea</i>
<i>Conferva</i>	—	<i>A. capillaris.</i>

In the body of the work they are described from the fructification—

<i>Tremella</i>	—	<i>Fruetificationes vix manifestæ in corpore gelatinoso.</i>
<i>Ulva</i>	—	<i>Fruetificationes in membranâ diaphanâ.</i>
<i>Fucus</i>	—	<i>Masc. Vesiculæ villis intertextæ.</i> <i>Fœm. Vesiculæ adpersæ granis immersis apice promi-</i> <i>nulis. Semina solitaria.</i>
<i>Conferva</i>	—	<i>Tubercula inæqualia in fibris capillaribus longissimis.</i>

The discrimination in the synoptic table need not engage our attention one moment; it does not hold true, neither has it any thing to do with the sexual system, by which all ought, and, it should be apprehended, may be determined, at least to a certain degree.

In respect to the descriptions of the fructification in the body of the work, we must object to the character of *Fucus* for the same reason that Gmelin does to Reaumur's male flowers. They have no appearance of *antheræ*, and the *villi* appear evidently to be nothing more than

the consequence of the internal laceration of the substance, as the part becomes dilated into the vesicle, which is, generally speaking, the mere organ of buoyancy, very rarely of fructification. We have seen these threads of different forms, size and texture, in proportion to the enlargement of the vesicle. If analogy must be resorted to, these threads ought rather to be considered as *nectaria* than any thing else belonging to the fructification: but, in fact, the whole idea is so vague and inconclusive, that nothing but the name of the illustrious author could have supported it for a moment; and even were it confirmed, there are very few species which could be made at all to agree with the description.

We should object to the character of *Ulva* for two reasons—First, he says *fructificationes*, without naming what sort; and then, because he adds, *in membranâ diaphanâ*; according to which, all the *Fuci* of the division *fronde planâ veniâ* must be denominated *Ulvæ*.

We must object to *Conserva*, because, from his term *tubercula inæqualia in fronde capillari*, all the *Fuci* with capillary branches must be included, particularly *F. purpurascens*, to name no more. Add to this, that on the *Conservæ* of the first and second division, as well as on several of the geniculated ones, no tubercles have ever yet been observed. They consequently do not at all agree with the character; nor are the simple-threaded *Conservæ* in any way distinguished from the filamentose *Byssi*, except by the totally inadmissible description, *fibris longissimis*.

The genus *Tremella* we shall pass by, as not connected with our present plan. Linnæus, forming the essential characters partly from external habit, and partly from fructification, considered those *Algæ* which were gelatinous as *Tremellæ*, and those which were membranaceous as *Ulvæ*. But as the essential characters which we shall propose are taken from the fructification solely, such gelati-

nous *Algæ* as have innate fructification dispersed throughout the *frons*, must necessarily be arranged in the genus *Ulva*; which will consequently include, if not all the aquatic, in great probability all the marine *Tremellæ*.

We must again call upon the candour of the Society not to impute these corrections of our great master Linnæus to any sinister views.—We see errors, we state them.

It is with the utmost diffidence, that, after having said so much, we presume to suggest any other descriptions in the room of those which we have rejected; but as it is absolutely necessary that some should be proposed, we would beg leave, from the very imperfect light by which we at present walk, to define the characters as follows :

- Fucus* — *Semina, tuberculis confertis apice debiscentibus, innata.*
Conserva — *Semina, tuberculis rotundis solitariis clausis fronde extantibus, adnatis, inclusa.*
Ulva — *Semina simplicissima frondi innata, undique sparsa.*

In stating these ideas of character we are thoroughly conscious of our imbecility and ignorance. We profess only to establish certain data from the appearance of what may be justly deemed fructification, and constitute our differences accordingly.

Before we dismiss this subject it may be proper to observe, that in many *Fuci* two sorts of fructification are to be seen—one warty tubercles, and the other numerous single grains. The observation of these has again led students to imagine that they are the differences of sex. Undoubtedly both these appearances are of the female flower, *i. e.* feminal—We have observed them occasionally in *F. alatus*, *vermicularis*, and *hypoglosson*, scattered along the rib or nerve, or on the membrane on each side of it. Some few of these
grains

grains we have observed swelling apparently into a tubercle, and the others disappearing. Whether this be the mode of perfecting the fructification, and that such of these grains as are impregnated swell into feminiferous tubercles, whilst the rest are abortive and decay—or, whether these grains may not be real seeds escaped from a tubercle, the coats of which are burst, and adhering to the frond, it were to be wished that naturalists resident on the sea-side would examine and endeavour to determine.

The tubercles of the greater part of the *Fuci* open at the point, are imbedded in the substance and become swollen as in *Serratus*, *Spiralis*, &c.—or assume a broad warty form as in *Laceratus* and some others of the division *Fronde planâ aveniâ*—are imbedded, smooth, and vesiculiform, as in *Crispus*, &c.—project very much from the *frons*, as in *Conservoides*—or are situated in a pedunculated capsular process, as in *Siliquosus*, *Pedunculatus*, &c.—But practice will make these and all other matters relating to the investigation, very easy to any student who has a real ardour for natural history.

It has been the general opinion of naturalists, that the root of *Fuci* is an organ of adhesion only, and not of nutrition. It seems so admirably calculated for the former of these purposes, that probably this idea has precluded all consideration of the latter. How the vegetation is carried on, cannot be precisely ascertained; and although it does not seem likely, that the root should draw nourishment from the rock, stone, or other body to which it is affixed, in the same manner as the roots of terrestrial plants from the earth in which they grow; yet it would be difficult to assert and bring proofs, that while it fixes, it does not also assist to nourish.—They are principles by no means incompatible. It is very possible, that the element in which these plants grow, may be imbibed at numberless minute pores on the surface of the frons, imperceptible

imperceptible to our sight, and that these pores may be common to the root with the rest of the plant, and thus the divine will may be accomplished.

All *Fuci* appear to proceed from a thin, round, entire or fissile, glutinous, coriaceous substance—This will appear to any one who will watch the growth of *F. loreus*. In some few this substance is fissile, and imitates the fibres of land plants: but each fibre attaches itself by its extremity, which immediately becomes a flat disk, to some rock, and, if the rock be smooth, longitudinally also. This mode of growth contributes greatly to strengthen Morison's opinion before mentioned—not that he thinks nourishment is performed by this adhesion, for his words immediately following those before quoted are—‘ But the plant, being formed from it, takes aliment to itself by
‘ means of little fibres (*fibrillæ*, i. e. branches) being put forth, by
‘ which aliment being continually nourished, it acquires its just
‘ magnitude; and there can scarcely be a doubt but that, together
‘ with its complete age and growth, it must receive a power of gene-
‘ rating another plant similar to itself. For since little tender *Fuci*,
‘ and as it were newly budding forth, are cast up upon the shore,
‘ which are fastened to shells and little stones, and at the ebb of the
‘ tide similar ones are to be seen affixed to hard rocks; it is far
‘ more likely that they are produced by this means, than that they
‘ should spring up out of those more solid bodies to which they
‘ adhere.’

Gmelin's idea of the root does not in this one instance accord with fact. He says, that those of our division *Fronde planâ aveniâ*, which are thin and papyraceous, have never shewn any appearance of root. Never was there a more palpable mistake. The root in all of them is a flat dilated disk, more or less in proportion to the size and substance of the plant. One of our thinnest and most tender

productions, *F. laceratus* var. *laciniatus*, has not only this kind of root, but sometimes for the space of two or three lines, has a roundish stalk before it is dissolved into its thin laminæ or branches.

The root is either purely fibrous as in *Saccharinus*, or between solid and fibrous as in *Serratus*, where a tendency to fibrous division is observable; but the fibres, which are somewhat prominent upon the surface, are webbed as it were, or connected by a thick membrane or the intervening part of the disk: or lastly, which is by far the most numerous, an entire solid disk. There are different modifications of this last sort of root. Sometimes, as in *Siliquosus*, it becomes in its more advanced age a solid woody cone—sometimes a plant having sprung from this disk, constantly throws out from its very base clusters of little furculi, which accidentally touching the rock form a callus, by which as by a new disk it adheres, and thence becomes the parent of a new plant. Its original, from a small disk, is thus so covered over and obscured, that it is not to be discerned. This takes place particularly in *F. purpurascens*, which hence is generally described with a fibrous root. From this furculosity at the base, and the furculi occasionally forming new disks and new plants, some *Fuci* appear to have creeping roots. Mr. Lightfoot describes his *F. repens, frondibus cæspitosis repentibus*. The *Fuci* in the division *Fronde planâ aveniâ*, when they attach themselves (as is no uncommon case) to other *Fuci*, envelop the whole branch, the thin papyraceous branches adhering wheresoever they touch.

The *F. natans* is described by Linnæus, *libere natans nec radicans*. These words must be understood to mean *floating at large, and not fastened by any root*. He never could mean, *having no root*; for his own specimen in the herbarium has one, which is a *discus explanatus*, and appears to have a very slight power of adhesion. It may be presumed that it is an inhabitant of the deep waters, beyond the reach

reach of human sight. Storms and tempests, dislodging it from its native bed, bear it in their uncontrollable violence to all the shores of the known world.

F. bulbosus is a plant *sui generis*—the disk immediately assumes an inflated bulbous form—the bulb becomes covered with numerous excrescences, which require very minute investigation. The ascertainment of its œconomy in this particular, as also of its fructification, would be a subject of very curious enquiry.

All plants produced from those rudiments of new branches observable on the surface of *mammillofus*, *rubens*, &c. must necessarily have a plain discoid root, that being the cause of their first adhesion.

After all the pains we have taken to make our descriptions complete, we are aware that many specimens will be found apparently much at variance with what we have asserted. This arises from two causes—from the mutilations which they suffer from the violence of the waves, or other injuries, and their growing nearer or more remote from the deflux of fresh water.

A very frequent effect of injury is the proliferous or reproductive tendency which is thereby occasioned, and which often so alters the natural appearance of the plant, as to entirely disguise it to the eye of an unpractised observer. This is extremely frequent in *F. sinuosus* (*rubens* Fl. Ang.) when the membranous parts are destroyed, and only the nerves or fibres remain, from which young leaves are frequently seen to shoot in great abundance, giving it an appearance so entirely different from that which it at first had, that it might easily be supposed a different species, did not the frequency of this plant afford us an opportunity of seeing it in all its varying forms. The *F. rubens* (*prolifer* of Lightfoot, *crispus* Fl. Ang.) perhaps owes some of its appearance to this cause; for the young

plants are at first entire, and those of a more advanced growth shew sometimes much less appearance of this proliferous tendency than others: but we cannot, in this species, attribute the whole of the particular habit to these accidental causes. The callous rings so frequently seen in *fastigiatus*, we suppose also to be principally occasioned by injury, as we have largely explained in treating of that species.

Injuries done to the coarser sorts may be more readily traced in their effects—*F. inflatus* is one instance of this, which is probably nothing more than *vesiculosus*, with a branch inflated or swollen by the injury of some insect or outward violence. The *vesiculosus* var. *foliaceus*, affords one of the most remarkable instances of reproduction occasioned by external violence. This has been first noticed by Major Vellely in Withering's Bot. Arr. vol. iii. p. 241; and as the passage is but short, we shall be excused for quoting it entire. 'If the *F. vesiculosus* receives an injury or fracture in any part of the leaf, provided it be in a healthy vegetating state, it constantly throws out abundance of young leaves from the injured part. If even a small aperture be made in the middle of it, a new leaf on either side will be found to shoot out.' Without this explanation it would appear extraordinary, that, where a branch is broken off, not only a cluster of new leaves should shoot from the fractured end, but that also numerous similar ones should be produced from the sides of the broken branch; which we have observed to take place. This will also account for the frequent appearance of these new leaves on the surface of the root itself, even whilst the plant is apparently in a perfectly uninjured state.

The soil, or their growing near fresh water, or altogether distant from it, makes a great difference in the size and texture of any plants. On the more inland banks of the Severn, and in the extensive æstuary in the north of Lancashire, formed by the influx of

the Ken, Leven, and other streams, *F. canaliculatus* is sometimes found remarkably luxuriant. At Ilfracombe, where there is a very trifling influx of fresh water, *F. fastigiatus* grows so slender and compact, that no inexperienced person would think it the same as the large *interceptus*. We suppose these things principally occasioned by the vicinity or absence of fresh streams. At Ilfracombe *F. fibrosus* grows scarcely more than a foot high; but we have seen it thrown up on the shore at Weymouth after a violent storm, literally appearing to us at first sight to be the root of some great tree. The different appearances of *multifidus* are occasioned by differences of soil, situation, or growth—as are those of *nodosus* also. We mention all these things chiefly with a view to apprise young students, that when we have given descriptions of the height, texture, substance, &c. yet still it is very possible that plants may be found differing considerably from our accounts.—All we wish to do is, to state the general appearance: we cannot be accountable for the irregularities which proceed from so many causes as are to be found in all the variations of growth, soil and climate.

Some little mention ought to be made of the colour and opacity of *Fuci*. In all our descriptions we have endeavoured to note the natural colour: but if plants have lain long in the water, and been left by the reflux of the tide on the shore, where they are necessarily exposed to the power of the wind and sun, the proper colour is oftentimes all discharged—they become white or black, &c. according to circumstances. In drying *Fuci*, green and red colours retain their proper appearance, but the olivaceous colours usually appear black. Where the change has been effected by drying only, the original colour may generally be detected by holding up the plant to a strong light of a candle or lamp.

Fuci are also more or less opaque from a variety of causes. Our variety of *fastigiatus* called *interceptus* is in general opaque: but the new branches produced beyond the rings at the extremity of the frons, that is after injury received, are green and somewhat pellucid; for in almost all plants the parts repaired are of a substance and texture weaker and softer than the sound parts. The *F. palmatus* is a remarkable instance of the difference of opacity—some specimens being thin as paper and pellucid, and others of a perfectly horny or leathery substance when dried. There are a few *Fuci*, which may perhaps hereafter be discovered to belong to the genus *Ulva*. We shall only mention *ligulatus* as an instance: but as this stands arranged among the *Fuci* by Mr. Lightfoot and Mr. Hudson, we leave it there, having no authority from any appearance of fructification to displace it. All *Fuci* are more or less pellucid and thin in their first beginnings. We have spoken of their substance as it is more generally observed in properly grown plants.

The structure of the *Fuci* is so very singular, that were they not affixed by their base to the rocks, as terrestrial plants are by their roots to the ground, we should be at a loss how to trace any kind of analogy between them—and yet it has been a favourite employment with all writers; and it countenanced Reaumur in his hypothesis of *Fuci* being provided with male and female flowers.

They are formed without leaves*, of one continued substance, of various texture, from the most tender and membranaceous to the most

* It may be objected, that we have said the *Fuci* are formed without leaves, and yet we take our two first divisions, *foliis distinctis* and *foliis unitis*, from that circumstance. It is not that the plants of those divisions really have leaves, but only the appearance of them; and we adapt this appearance to the general language of the Linnæan system. The plants arranged under both these divisions do not make up a fifth part of the whole. By the

most firm and thick—numerous beyond description, capable of being turned to the use of man in many ways, both as to food and other conveniences, and affording protection and support to myriads of the submarine inhabitants—All this marks the goodness of the ever blessed Godhead, ‘by whom they are and were created.’—That part in creation is not to be found, where some principle does not invariably act beneficial to man.

N. B. As we have referred to several of the old *Herbaria* preserved in the British Museum, it is proper to mention that they are as follow :

Buddle, *Plantæ Britannicæ*, vol. I.

Petiver, *Hortus Siccus Anglicus*, vol. I.

Uvedale, *Herbarium Rayanum*, vol. I.

Mosses and Plants by *Buddle*, *Vernon*, *Floyd*, *Cowrton*, &c.

the first those plants are designed, the branches of which have the appearance of leaves growing distinct. Of these, *natans*, *sanguineus*, and *sinuosus* have what any one would deem leaves, but, when attentively considered and compared with others, appear to be branches (the *fibrilla* of Morison) growing up into, or dilated into, a thin membrane—In *membranifolius* it is very evidently so.

By the second division, *foliis unitis*, are designed those which appear to have leaves united with and forming a part of the frons—These leaves are only so in appearance, for in fact they are rudiments of branches, or more properly young branches themselves. All the ramifications of *F. fibrosus* are produced from what appears to be a leaf dividing itself, and then soon losing its original shape. This is still more observable in *F. abrotanifolius*, as will be seen by referring to our description of that plant. *F. fœniculaceus* also (*concat.* Fl Ang.) and *F. concatenatus* Linn. have branches which first appear under the form of linear leaves, afterwards branching out into minute ramifications. The concatenated vesicles which characterise these two plants, are merely formed from these leaves contracting themselves at regular intervals, whilst at the same time the coats of the leaf, in the intervening spaces, separate, and thus form hollow vesicles. *F. siliquosus* and *selaginoides* will give striking proofs of the same kind.

SYNOPSIS

SYNOPSIS SPECIERUM.

Foliis distinctis.

1. *F. natans.* Caule tereti ramosissimo; foliis lanceolatis ferratis; vesiculis globosis pedunculatis.
2. *F. sanguineus.* Caule tereti ramoso; foliis simplicibus ovato-oblongis, obtusis, undulatis, integerrimis.
3. *F. sinuosus.* Caule tereti ramoso; foliis oblongis undulatis ramoso-sinuatis, spinoso-dentatis.
4. *F. Hypoglosson.* Caule alato ramoso; foliis lineari-lanceolatis planis integerrimis proliferis.
5. *F. ovalis.* Caule tereti ramoso, rigidiusculo; foliis ovalibus carnosis.
6. *F. sedoides.* Caule tereti ramoso tenero; ramis dichotomis; foliis cylindricis utrinque attenuatis, superioribus confertis.
7. *F. dasypphyllus.* Caule tereti ramoso; ramis filiformibus subsimplicibus; foliis cylindricis obtusis, basi attenuatis, sparsis.
8. *F. membranifolius.* Caule tereti ramoso, apice membranaceo dilatato dichotomo; foliis enerviis sub-bilobis; tuberculis pedunculatis.

* *Kaliformis.** *Foliis unitis.*

9. *F. ligulatus.* Fronde planâ aveniâ sub-triplicato-pinnatâ; ramis ramulisque distichis; foliis lineari-lanceolatis, spinoso-dentatis.
10. *F. siliquosus.* Fronde compressâ ramosâ; foliis distichis alternis oblongis; vesiculis pedunculatis oblongis articulatis mucronatis.
11. *F. abrotanifolius.* Fronde filiformi compressâ pinnatâ; ramulis extremis vesiculosis; vesiculis terminatis foliolis multipartitis obtusis.

12. *F.*

12. *F. barbatus.* Fronde filiformi ramosissimâ, ramulis extremis apice tuberculatis tuberculis congestis foliolo subulato terminatis.
13. *F. ericoides.* Fronde filiformi ramosissimâ; foliis subulatis, terminalibus confertis, arctè imbricatis, basi tuberculiferis.
14. *F. granulatus.* Fronde filiformi ramosissimâ debili; foliis subulatis laxiusculè imbricatis basi tuberculiferis; tuberculis contiguis.
15. *F. selaginoides.* Fronde filiformi ramosissimâ debili; foliis subulatis remotiusculis; vesiculis foliorum superiorum basi innatis.
17. *F. fœniculaceus.* Fronde filiformi ramosissimâ; ramis sub-dichotomis; foliis subulatis æqualibus; vesiculis oblongis concatenatis innatis.
17. *F. fibrosus.* Fronde filiformi ramosissimâ; ramis primariis subdistichis; foliis filiformibus linearibusque; vesiculis subrotundis innatis.

** *Alati, s. Fronde planâ, stipite medium folium percurrente.*

18. *F. tetragonus.* Fronde simplici ensiformi basi rotundatâ; stipite alato quadrangulari.
19. *F. teres.* Fronde simplice ensiformi basi attenuatâ; stipite alato tereti compressiusculo.
20. *F. alatus.* Fronde membranaceâ tenerrimâ ramosâ subdichotomâ.
21. *F. serratus.* Fronde dichotomâ ferrato-dentatâ, apicibus planis tuberculatis obtusis.
22. *F. vesiculosus.* Fronde dichotomâ integerrimâ; vesiculis innatis axillaribusque; apicibus tumidis tuberculatis acutiusculis.
23. *F. spiralis.* Fronde planâ dichotomâ æquali; apicibus tumidis tuberculatis tumidis.

24. *F. ceranoides.* Fronde planâ dichotomâ integerrimâ æquali; apicibus tumidiusculis tuberculatis lanceolatis.

* *Dentatus, Rubens.*

*** *Fronde planâ aveniâ.*

25. *F. saccharinus.* Fronde simplice ensiformi.

26. *F. digitatus.* Fronde palmatâ, laciniis ensiformibus; stipite tereti; radice fibrosâ.

27. *F. bulbosus.* Fronde palmatâ, laciniis ensiformibus; stipite plano; radice inflato-bulbosâ.

28. *F. laceratus.* Fronde membranaceâ tenerrimâ ramosâ; ramis ramulisque sublinearibus, apice obtusis.

29. *F. dentatus.* Fronde membranaceâ tenerrimâ ramosâ, alternatim pinnatifidâ; ramulis linearibus apice incisus; lacinulis acutis.

30. *F. bifidus.* Frondibus membranaceis sub-dilatatis bifidis, segmentis sub-divaricatis obtusis; tuberculis marginalibus distantibus.

31. *F. ciliatus.* Fronde sub-membranaceâ ramosâ; ramis lanceolatis acutis ciliatis, ciliis simplicibus brevibus.

32. *F. jubatus.* Fronde membranaceâ ramosissimâ; ramis lanceolatis acutis ciliatis, ciliis ramosis.

33. *F. palmatus.* Fronde membranaceâ variè divisâ, palmatâ.

34. *F. rubens.* Fronde sub-membranaceâ dichotomâ; ramis proli-feris linearibus, ramulis apice dilatatis bifidis, laciniis acutiusculis.

35. *F. pinnatifidus.* Fronde cartilagineâ ramosâ; ramis patentibus sub-duplicato-pinnatifidis, ramulis obtusis callofis.

36. *F. crispus.* Fronde submembranaceâ dichotomâ; ramis integris; tuberculis solitariis sparsis.

*** *Fronde aveniâ hinc canaliculatâ.*

37. *F. canaliculatus.* Fronde dichotomâ lineari; apicibus obtusis tuberculosis.

38. *F.*

38. *F. patens.* Fronde dichotomâ lineari, apicibus obtusiusculis planis; tuberculis subglobosis sparsis.
39. *F. mammillofus.* Fronde dichotomâ; ramis supernè dilatatis utrinque mammilloso-tuberculiferis, apicibus acutis.
- ***** *Fronde compressâ.*
40. *F. loreus.* Fronde dichotomâ acutâ glabrâ, utrinque tuberculatâ.
41. *F. aculeatus.* Fronde subcartilagineâ ramosissimâ dentatâ, dentibus marginalibus subulatis erectis.
42. *F. corneus.* Fronde cartilagineâ ramosissimâ, ramis latioribus alternis, ramulis oppositis divaricato-ascendentibus obtusis.
43. *F. gigartinus.* Fronde cartilagineâ dichotomâ ramosâ; ramis æqualibus acutis spinoso-dentatis; tuberculis globosis lateralibus sessilibus.
44. *F. coronopifolius.* Fronde cartilagineâ ramosissimâ; ramulis obtusis multifidis sub-confertis; tuberculis globosis pedunculatis, sessilibusque.
45. *F. coccineus.* Fronde subcartilagineâ ramosissimâ; ramulis subulatis secundis, tuberculis globosis subsessilibus.
46. *F. plumosus.* Fronde subcartilagineâ ramosissimâ; ramis supra-decomposito-pinnatis; ramulis oppositis; tuberculis globosis pedunculatis.
47. *F. nodosus.* Fronde sub-dichotomâ; foliis distichis obovatis integerrimis; vesiculis innatis solitariis fronde latioribus.
48. *F. obtusus.* Fronde cartilagineâ ramosissimâ; ramis ramulisque sub-oppositis, erectiusculis, obtusissimis, truncatis.
49. *F. lichenoides.* Fronde dichotomâ ramosâ; ramis apice dilatatis; tuberculis globosis terminalibus.

* *Crispus.* *Var. e.*

***** *Fronde tereti.*

50. *F. Filum.* Fronde filiformi simplice.
51. *F. tomentosus.* Fronde filiformi ramosâ tomentosâ ; ramis dichotomis apicibus angulisque obtusis.
52. *F. diffusus.* Fronde filiformi dichotomâ articulatâ ; ramis divaricatis diffusis apice acutis.
53. *F. tuberculatus.* Fronde filiformi dichotomâ ; ramis inæqualibus obtusis apice tuberculatis, angulis ramificationum obtusis.
54. *F. fastigiatus.* Fronde filiformi dichotomâ ramosissimâ ; ramis fastigiatis æqualibus obtusis, angulis ramificationum sub-rectis.
55. *F. radiatus.* Fronde filiformi dichotomâ ramosâ ; ramis sub-æqualibus acuminatis ; tuberculis lateralibus ; angulis ramificationum obtusiusculis.
56. *F. lumbricalis.* Fronde filiformi dichotomâ ramosâ ; ramis sub-æqualibus acuminatis, angulis ramificationum acutis.
57. *F. Kaliformis.* Fronde filiformi sub-gelatinosâ tubulosâ ramosissimâ ; ramis sparsis ; ramulis sub-verticillatis obtusiusculis.
58. *F. confervoides.* Fronde filiformi ramosâ ; ramis sub-distichis sub-simplicibus fetaceis ; tuberculis lateralibus semiglobosis.
59. *F. albidus.* Fronde filiformi sub-dichotomâ ramosissimâ ; ramis subsecundis, tuberculis lateralibus subrotundis depressis.
60. *F. subfuscus.* Fronde filiformi ramosissimâ ; ramis sparsis, ramulis subulatis sub-alternis ; tuberculis racemosis sub-octospermis.
61. *F. pedunculatus.* Fronde filiformi pinnato-ramosâ ; ramis fetaceis simplicibus ; tuberculis oblongis pedunculatis sparsis.
62. *F. asparagoides.* Fronde filiformi ramosissimâ ; tuberculis globosis, pedunculatis, ramulis subulato-fetaceis alternatim oppositis.

63. *F. tenuissimus.* Fronde filiformi ramosissimâ; ramis omnibus capillaribus alternis; ramulis acutis tuberculatis.
64. *F. articulatus.* Fronde membranaceâ filiformi tubulosâ concatenatim articulatâ ramosissimâ; ramis uniformibus dichotomis verticillatisque.
65. *F. Opuntia.* Fronde cartilagineâ subcompressâ solidâ, concatenatim articulatâ ramosâ; ramis uniformibus dichotomis.
66. *F. variabilis.* Fronde filiformi ramosissimâ; ramis subimbricatis, ramulis brevissimis fasciculatis acutis.
67. *F. pinastroides.* Fronde filiformi ramosissimâ; ramulis arctè imbricatis subulatis sub-secundis, apice incurvatis integris.
68. *F. Lycopodioides.* Fronde filiformi subsimplici; ramis subulatis subramosis undique imbricatis squarrosis.
69. *F. purpurascens.* Fronde filiformi ramosissimâ; ramulis setaceis sparsis; tuberculis subrotundis innatis.
70. *F. amphibius.* Fronde filiformi ramosissimâ; ramis alternis; ramulis capillaribus, apice involutis tuberculatis.
71. *F. plicatus.* Fronde filiformi dichotomâ ramosissimâ implexâ; ramulis subsecundis; tuberculis lateralibus terminalibusque.
72. *F. capillaris.* Fronde subquadripinnatâ; ramis ramulisque omnibus alternis, primariis longissimis, ultimis brevissimis fasciculatis tenuissimis.

I. FUCUS NATANS.

F. caule tereti ramosissimo, foliis lanceolatis ferratis, vesiculis globosis pedunculatis. Herb. Linn.—Buddle, p. 33. n. 1. Uvedale, appendix, p. 84. n. 1. & p. 86.

Linn. Sp. Pl. 1628. *Fl. Ang.* p. 572. *Withering*, vol. 3.

p. 234.

Habitat inter rejectamenta maris.

Radix, callus explanatus—*Frons* pedalis et ultra ramofissima, caule ramisque teretibus, frequentissime retis instar implicitis—*Folia* alterna, sessilia, variant longitudine 1-2-3 uncialia; et latitudinem modo vix linearem, modo plusquam uncialem attinent, ideoque nunc lineari-lanceolata, nunc lanceolata, et nonnunquam ovali-lanceolata dici possint, formam autem qualemcunque lanceolatam semper conservant. Foliorum margines constanter ferrati, ferraturis acutis distantibus—*Rami*, vesiculis globosis pedunculatis, et frequentissime processibus styliformibus terminatis, semper vacuis, vestiti sunt—*Ramuli* fructificationem sustentantes, axillares, paniculati aphylli, tuberculis minutis quaquaversum obfiti—*Color* recentis plantæ flavescens, siccatæ purpureus, nigrescens.

This plant, so well known by the name of *Gulf-weed*, to all persons who navigate the Atlantic Ocean, is described by Linnæus as not being fixed by any root, and being only found floating loosely in the sea. It does not appear that any person has hitherto detected it on its native rocks, notwithstanding the immense quantities which are constantly seen between Europe and America; but we have described the root on the authority of the specimen preserved in the Linnæan Herbarium, and of Gmelin, who declares (p. 94), that he has in his possession specimens with fragments of the rock adhering, and one on which part of the orbicular base remains. The spherical vesicles with which this species always abounds, have been described as containing the fructification; but these are always empty, and are certainly only intended to give buoyancy to the plant, and to enable it constantly to remain on the surface of the waves. The
actual

actual fructification is noticed by Linnæus, though he still seems to have considered the vesicles as performing that function. It consists of small, naked, paniculated ramuli, not more than half an inch in length, situated in the bosom of the leaves, and entirely covered with minute tubercles: or these may probably be merely congeries of tubercles assuming that form; as these panicked branches are never observed, except when the plant is in fructification, nor otherwise than covered with tubercles. The vesicles are often naked; but sometimes they are terminated by a setaceous or subulate process resembling a style, which is nothing more than the footstalk continued beyond the vesicle. Many interesting particulars relating to this extraordinary plant, collected from various authors, are mentioned by Gmelin; for which we refer the curious reader to that work, as it would occupy too much room, and be foreign to our design to record them here.

Lourreir in his *Fl. Cochinchinensis* speaks of this plant. He advances nothing new upon the subject. Indeed he seems to know but little of this genus, having noticed only seven species.

2. FUCUS SANGUINEUS.

F. caule tereti ramoso, foliis simplicibus ovato-oblongis obtusis undulatis integerrimis. *Herb. Linn.*

Mor. Hist. Oxon. 3. p. 645. f. 15. t. 8. f. 6. *R. Syn.* p. 47.

n. 35. *Fl. Dan.* 349. *Gmelin,* p. 185. t. 24. f. 2. *Linn.*

Syst. Fl. Ang. p. 573. *Fl. Scot.* p. 942. *Withering,* vol. 3.

p. 235.

Habitat in rupibus et faxis marinis.

Adhæret rupibus callo solido difformi—*Frons* semipedalis, etiam pedalis, purpurea, diaphana—*Caulis* brevis, teres, pro magnitudine plantæ

plantæ variat, nunc crassitiem pennæ corvinæ, nunc anserinæ minoris æquans; modo semel, modo bis iterumve ramosus—*Rami* petiolorum funguntur vice, et foliis membranaceis, tenerrimis, simplicibus, ovato-oblongis, obtusis, quorum margines elegantissimè undulati sunt, terminantur—*Folium* nervus crassiusculus percurrit, aliis minoribus oppositis vel alternis ramosis, pinnatus; nonnunquam è nervo primario petiolus prodit, folium alterum quasi proliferum formans—*Fructificatio*, tubercula sphærica pedunculata, atro-purpurea in petiolis, rarius in nervis foliorum sita.

This plant may undoubtedly be considered as the most beautiful of the whole genus. The elegant form, the waved margins, and delicate veining of the leaves will readily distinguish it from all its congeners. The substance of the stem is cartilaginous, that of the leaves membranaceous, extremely thin and tender; the whole is generally diaphanous, though in a very advanced state the stem is sometimes opaque. It frequently is only simply branched; the stem is then very short, and bears a few leaves, each supported on a short footstalk: others are very much branched, but in these the separate branches soon terminate, and form footstalks to the leaves: in the former state it is well represented by *Gmelin*, and in the latter is very well figured in *Fl. Dan.* The leaves vary from three or four inches to a foot in length, and from half an inch to two or more in breadth. The footstalk is nearly round, but is continued through the leaf, where it is compressed, and forms a strong midrib, which is pinnated with others very slender, and either simple or branched at the base. These are sometimes alternate, but more frequently opposite, as represented in *Fl. Dan.* though they are very rarely so conspicuous, or so much branched as in that figure. Sometimes the leaf becomes proliferous, a footstalk arising from the midrib,
and

and forming a new leaf, similar to, and nearly as large as, that from which it issues. The fructification, which is rarely met with, consists of minute round tubercles, each supported on a short peduncle, and when filled with ripe seeds of a dark purple colour, nearly black, situate on the footstalks of the leaves. Similar tubercles are sometimes observed placed on the midrib of the larger leaves. It adheres to the rocks by a small, thick, solid, but knobbed and misshapen callosity, and is found on various parts of the British coast. We have met with it at Sidmouth in Devonshire, and Falmouth in Cornwall; and it has also been thrown up along with other rejectamenta upon the sandy shore at Yarmouth in Norfolk.

3. FUCUS SINUOSUS.

F. caule tereti ramoso, foliis oblongis undulatis ramoso-sinuatis spinoso-dentatis. *Buddle, p. 26. n. 3. Uvedale, p. 12. n. 3.*

R. Syn. p. 47. n. 34. Fl. Dan. t. 652.

Fucus crenatus. Gmelin, 184. t. 24. f. 1.

Fucus rubens. Fl. Ang. p. 573. Fl. Scot. p. 943. Withering, vol. 3. p. 235.

Var. β foliis subcartilagineis dentatis.

Habitat in littoribus marinis ubique; β apud Cromer Norfolciæ.

Adhæret rupibus callo paululum explanato—*Frons* palmaris, rubra—*Caulis* filiformis, teres, crassitie fili emporetici minoris, ramosus—*Folia* sub-opposita membranacea, tenera, obovata, crenata crenis distantibus, sesquiuncialia, nervosa—*Nervus* primarius medium folium percurrens, aliis constanter oppositis pinnatus est—maturâ plantâ folia prolifera evadunt; scilicet nervi laterales elongati, et demum foliorum oblongorum primarii fiunt; exinde mar-

gines, necnon, sed rarius, utriusque paginæ nervi, processibus dentato-spinosis tuberculiferis armati sunt.

From the examination of the Linnæan Herbarium it appears, that this elegant species was entirely unknown to Linnæus, and that the *rubens* of *Sp. Pl.* and his other works is the plant which is called *crispus* in the *Flora Anglica*, and *prolifer* in the *Flora Scotica*. We have therefore been under the necessity of giving a new name to this species.

The different appearances of this plant in the different stages of its growth, render it very difficult to give a description by which it may be recognised at all ages, and at the same time to avoid that prolixity which is so repugnant to the principles laid down in the *Philosophia Botanica*.

In its young state, it presents a branched frond with obovate crenated leaves, extremely resembling in shape the young leaves of the oak; whence its English name. After this the lateral nerves shoot out, the *crenæ* are formed into deep fissures, and the separate leaves put on a pinnatifid appearance, with somewhat linear segments. In the change from one of these states to the other, it is excellently figured *Fl. Dan.* 652, where both sorts of leaves are represented. *Gm.* 24. 1. represents it in a more advanced state, but very indifferently.

In maturity, the whole margin of the frond is closely fringed with what appear to the naked eye to be minute spines or cilia, and which examined with a common eye-glass in a state of fructification might be supposed lanceolate pedunculated tubercles; but which when highly magnified are found to be dentated processes of the leaf, in which are imbedded minute tubercles replete with seeds.

In some of the older specimens, but very rarely, these processes are also to be seen on the nerves, as well lateral as principal, on each surface of the leaf; and even on the naked nerve, where it has been deprived of its membrane. When in this state they are of different sizes, and clearly shew themselves to be really proliferous leaves, evincing the remarkably strong reproductive property possessed by this species, to which the various forms in which it appears are principally owing; for, in a very advanced state, it frequently happens that the membranaceous part of the leaf is much torn and destroyed, the ribs then appear like branchings of the stem, and from every part of them young leaves are seen to arise, and even from the ribs and nerves of the decaying leaves.

The whole plant is bright red, the leaves membranaceous, extremely thin and delicate; the fructification deep red, when ripe nearly black.

β . a variety occurs, though rarely of a substance approaching to cartilaginous, in which the processes on the margin are more distant, much larger, and appear flat to the naked eye, shewing themselves to be teeth and not spines or cilia, each having, when in fructification, a larger and more conspicuous tubercle imbedded in it. We have met with this variety only at Cromer on the coast of Norfolk.

4. FUCUS HYPOGLOSSUM.

F. caule ramofo alato, foliis lineari-lanceolatis planis integerrimis proliferis. *Linn. Transf. v. 2. p. 30. t. 7.*

F. Hypoglossum—F. lingulatus. *Solander in Herb. Banks.*

Habitat in rupibus submarinis satis frequens.

Radix callus minimus crassus—*Frons* 2—3 uncialis lætè rubra,

membranacea tenerrima—*Caulis* brevissimus, teres, filiformis ramosus, ramis membranâ tenuissimâ utrinque alatis—*Folia* membranacea plana, integerrima, figurâ magnopere variant; plerumque lineari-lanceolata sunt, sæpe autem linearia, lanceolata; nonnunquam ad formam ovalem accedentia inveniuntur. Folia adultiorum percurrit costa crassiuscula, ex quâ oriuntur folia plurima prolifera, et ex his iterum iterumque alia, postrema semper lanceolata—*Fructificatio*, tubercula parva ruberrima, in ipsâ costâ sita—Occurrunt etiam specimina in quibus tubercula nulla in costis adsunt, sed granula minutissima rubra in membranâ ad utrumque costæ latus feriatim disposita observantur.

This elegant species cannot be confounded with any other in this division, or indeed in the whole genus; the perfectly entire leaves, repeatedly proliforous, and always from the midrib, with the total absence of lateral nerves, sufficiently distinguishing it.

The stalk, and the short branches, from which the leaves arise, are winged with a thin membrane in the younger plants; and from this circumstance, in a former volume of these Transactions, it was proposed to place it in the order *Alati*: but in the older specimens this membrane is frequently wanting; and the leaves being as completely distinct as in *sanguineus*, or any other species in this division, it has been thought most consonant to the general arrangement to place it here.

The twofold appearance of the fructification requires particular observation. In some plants conspicuous tubercles of a deep red colour, and evidently filled with seeds, are to be observed on the midrib—in others, only very minute red dots, disposed in parallel lines, upon the membrane on each side of the midrib; and these different appearances have never been observed on the same plant.

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In consequence of this, the celebrated Dr. Solander, in a manuscript preserved in the library of Sir Joseph Banks, has described them as two different species; at the same time expressing his doubts whether they might not be male and female of the same species. In the present imperfect knowledge of the nature and properties of marine plants, it is impossible for us to determine this point; and from the impracticability of examining these plants whilst actually growing in their native element, it is probable that the manner in which the impregnation is performed may ever remain among the arcana of nature. We cannot however doubt, but that both these appearances are that of female fructification: for in *F. alatus*, and some other species, granules as well as tubercles are observed; and they have been traced from one to the other, so as to allow us to conclude that the granules are the first visible appearances of the female fructification, and that some of them swell into tubercles, whilst others are abortive and disappear. It is extremely probable that these circumstances also take place in this species: the only objection to it is, that the granules for the most part appear on the membranaceous parts, and the seed-bearing tubercles are never found in any other situation than on the midrib.

That these granules are seeds escaped from, or exposed by the deciduous coats of the tubercles, as suggested in the former description of this plant, is improbable, from the regularity of their disposition, and the space which they so regularly cover in every specimen which has been observed, though we have reason to suppose that one of these circumstances does take place in a species recently discovered by the ingenious Mr. Stackhouse, a member of this Society, and which will be described by him.

In this state of uncertainty we must conclude the subject, with allowing that it is not impossible, but that these plants, though so

perfectly similar in appearance, may be, as supposed by Dr. Solander, really distinct species, and recommending to botanists situated on the shores where they are found, to observe them carefully at all seasons. It may be proper to notice, that the specimens which have been found plentifully on the Norfolk coast, have all been of the tuberculated sort; and that these have been but rarely met with on the western coast, where the granulated sort is very frequent.

5. FUCUS OVALIS.

F. caule tereti ramoso rigidiusculo, foliis ovalibus carnosiss.

Jacquin Collect. v. 3. t. 13. f. 1.

Fl. Ang. p. 578. Withering, vol. 3. p. 235.

Habitat in rupibus marinis in Insulâ Portlandicâ—propè Exmouth.

Radix fibrosa—*Frons* 3—4 uncialis, rubra—*Caulis* teres, filiformis, rigidiusculus, crassitie fili emporetici minoris, ramosus—*Rami* pauci ejusdem ac caulis crassitie et substantiæ, patentés—*Folia* ovalia valdè carnosissima, subgelatinosa, tres lineas longa, vix sesquilineam lata, sæpiùs sessilia, nonnunquam petiolo brevissimo instructa, nunc alterna, nunc sparsa, infernè rariora, apicem frondis versus subconferta—*Fructificatio*, tubercula parva, ex rubro nigrescentia in foliis præsertim inferioribus sparsa, exserta, necnon ramis adhærentia.

This elegant species is distinguished from *sedoides* by its more rigid and patent branches, and by the shape of its leaves, which are more thinly scattered below, but somewhat crowded upwards. It is farther distinguished by the fructification, which consists of much larger and fewer tubercles than in *sedoides*, situated upon the surface of the leaves, from which they visibly project. The distinctions

tions between this and *dasyphyllus* are sufficiently pointed out under that species.

From the specific characters and descriptions given of this plant, and *sedoides* which follows it, they cannot but be considered as perfectly distinct; but a confusion has arisen from Mr. Hudson's having quoted two different species of Gmelin for this plant, which was probably occasioned by his having never seen *sedoides*. Mr. Lightfoot certainly considered them as distinct, having quoted Gmelin's *vermicularis*, and taken no notice whatsoever of his *polypodioides*, or the *ovalis* of Hudson.

That the *polypodioides* of Gmelin ought to be referred to this species cannot be doubted, when it is considered that he inserts it solely on the authority of Martyn, whose figure is very indifferent, and who has given no description. As to his describing the leaves as membranaceous instead of fleshy, that ought to have no weight, as the dried specimens must always have that appearance. It is owing to this also that Gmelin has erroneously placed this species amongst his membranaceous *fuci*, when it certainly ought to have been placed next to *vermicularis*.

Sometimes largish solitary tubercles are observed adhering to the main branches and to the leaves also. This we deem the true form of the fructification. It is very rarely to be met with in this situation.

6. FUCUS SEDOIDES.

F. caule tereti ramoso tenero, ramis dichotomis, foliis cylindricis utrinque attenuatis superioribus confertis. *Reaumur, Act. Gall. 1712. p. 40. t. 4. f. 8.*

Fucus vermicularis. Gm. p. 162. t. 18. f. 4. mala. Fl. Scot. p. 958.

Habitat

Habitat in rupibus Insularum Juræ. *D. Lightfoot*. Inter rejectamenta maris apud Yarmouth Norfolkicæ legimus.

Radix callus paululum explanatus—*Frons* triuncialis ex albo virens, nonnunquam etiam rubescens, tenera—*Caulis* teres, filiformis, crassitie fili emporetici minoris, ramosus—*Rami* dichotomi, subdivaricati, caule vix tenuiores—*Folia* cylindrica utrinque attenuata, nonnunquam bifida, sparsa, ad superiorem frondis partem confertissima, gelatinosa—*Fructificatio*, tubercula numerosissima, minutissima, lætè rubra, in foliis præsertim superioribus sita.

This species is sufficiently distinguished from its affinities, *ovalis* and *dasyphyllus*, in the descriptions of those plants. That it has been confounded with *ovalis* cannot be doubted by any one who considers the descriptions of Hudson and Lightfoot, and compares them with the account given by Gmelin in his *Hist. Fucorum* (p. 162—186) of his two species, *vermicularis* and *polypodioides*. Mr. Lightfoot's accurate description of *vermicularis* clearly points out this plant; and though it was not necessary for him to mark any distinctions between this and Mr. Hudson's *ovalis*, it is certain he considered them distinct, from his not quoting *ovalis* as a synonym, or taking any notice of Gmelin's *polypodioides*.

The shape and growth of the leaves very much resemble the *Sedum album* of Linn. as observed in *Fl. Scot.*; and this has induced us to give to this species the trivial name of *sedoides*, instead of the unmeaning one of *vermicularis*, which had been adopted from Gmelin.

The whole plant is more tender and gelatinous than *ovalis*, and the fructification differs considerably, consisting of extremely minute red tubercles, placed on the leaves, particularly the upper ones, and scarcely rising above the surface. In this circumstance it nearly approaches the genus *Ulva*; but when it is considered that
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the fructification is not distributed over the whole of the frond, and, though situated almost within the surface, is not actually immersed, and that not any is to be found in the internal substance of the leaves, the propriety of placing it in the genus *Fucus*, will scarcely be disputed.

We have never found it in a growing state, but have gathered it amongst other rejectamenta on the beach at Yarmouth in Norfolk; we cannot therefore speak with certainty of its mode of growth, but have ventured to describe the root as discoid on the authority of Gmelin.

7. FUCUS DASYPHYLLUS.

F. caule tereti ramoso, ramis filiformibus sub-simplicibus, foliis cylindricis obtusis basi attenuatis sparsis.

Linn. Transf. vol. 2. p. 239. t. 23. f. 1. 2. 3.

Habitat in rupibus et saxis marinis apud Cromer Norfolciæ.

Adhæret rupibus disco paululum explanato, furculos emittente, unde novæ frondes oriuntur—*Frons* solitaria seu gregaria, sub-cartilaginea tenera, teres, filiformis, rubra, statim ramosa—*Rami* filiformes, sub-simplices, crassitie fili emporetici minoris, ad basin sub-nudi, dein foliacei, apicibus obtusis—*Folia* cylindrica, sub-gelatinosa, sessilia, apice obtusissima, basi valde attenuata, 1—4 lineas longa, semilineam lata, inferiora longiora, superiora breviora, frequentissimè aliorum minorum prolifera, pallidè rubra nonnunquam viridantia—*Fructificatio*, tubercula minutissima, ruberrima, sparsa, ad inferiorem ramorum partem, aliquandò etiam sed rariùs in foliis sita.

This species is distinguished from *ovalis* and *sedoides*, the only ones in this sub-division to which it has any affinity, by the

shape of the leaves, and by the fructification, which in the two latter is usually on the leaves, but in this is very rarely found in that situation, but is scattered on the lower branches where they are destitute of leaves.

In a description given of this plant in a former volume of the Linnæan Transactions, it is hinted that probably this species and *ovalis* ought rather to be placed in the division *fronde tereti*; and most certainly this in particular has great affinity with some of the plants in that division, the leaves being nearly of the same substance as the rest of the frond, and the tubercles being principally situated on the naked branches. But on more mature consideration, we are convinced that *ovalis* cannot properly be arranged in any other division than the present, the shape of the leaves, and their somewhat compressed surface, absolutely forbidding it; and the very great affinity which subsists between *dasyphyllus*, *ovalis*, and *sedoides*, requires that they should be placed together. This must therefore be considered as adding one more to the numerous proofs of the impossibility of confining the endless variety of nature within the bounds of any artificial system.

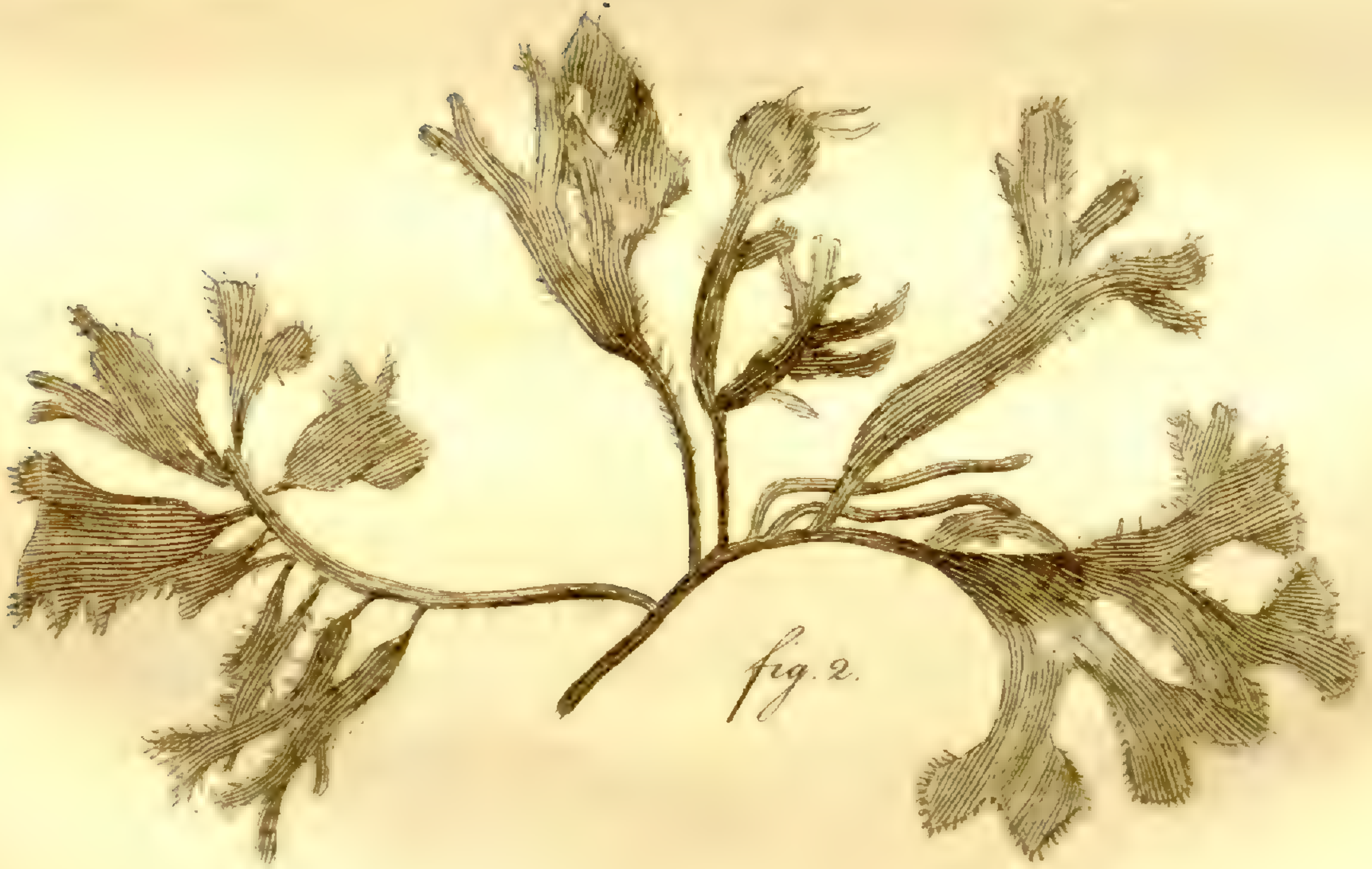
It grows, but not very abundantly, on the rocks and stones at Cromer on the coast of Norfolk, and has been found on various other parts of the British coast.

8. *FUCUS MEMBRANIFOLIUS*. TAB. 16. *Fig. 1, 2.*

F. caule tereti ramoso apice membranaceo dilatato dichotomo, foliis enerviis sub-bilobis, tuberculis pedunculatis.

Var. β *radicans*—foliis basi incrassatis sanguineis. *Buddle, p. 27, n. 6.*

Var. γ *lacer*—foliis æqualibus sub-linearibus. *Buddle, p. 27, n. 1. 4.*
Mor.



M.S.G. delin.

F. membranifolius.

Mor. Hist. Oxon. iii. p. 648. f. 15. t. 9. f. 2. *R. Syn.* p. 44.
n. 19.

Fucus Pseudoceranoides. *Gmelin.* p. 119. t. 7. f. 4.

Fucus ceranoides var. γ *lacerus.* *Fl. Ang.* p. 583. *Fl. Scot.*
p. 916. *Withering,* vol. 3. p. 249.

Var. δ *fimbriatus*—foliis ciliatis. *Fig.* 2.

Fucus fimbriatus. *Fl. Ang.* p. 574. *Withering,* vol. 3. p. 236.

Habitat in rupibus et faxis submarinis.—Var. δ in Insulâ Portlan-
dicâ, sed rariùs.

Radix, discus explanatus—*Caulis* 2—9 uncialis, subdichotomus, ramosus, basi nudus, simplex, teretiussculus, supernè foliosus, ramosus, compressus—*Rami* omnes ad latera folia membranacea, semuncialia, dilatata, breviter petiolata, rubra gerunt; apex in membranam breviusculam, dilatatam, rubram, variè dichotomam abit—Hæc membrana foliorum formam omnino refert—*Folia* lateralia sæpe simplicia, modo biloba; horum lobi, tum membranæ terminalis, obtusi sunt—*Fructificatio,* tubercula, ad latera ramorum sita, parva, ovata, compressa, glabra, breviter pedunculata, pedunculo compresso, seminibus rubris foeta.

Var. β in omnibus fere α simillima est, at lobi foliorum, membranæque terminalis sæpiùs acutiussculi—*Rami,* antequam in membranam abeunt, longius protensi sunt, et inde radicibus, quæ ex cauliculis plantarum repentibus prodeunt, haud absimiles. Quod autem præcipuè observandum, basis foliorum, tum etiam membranæ terminalis, incrassatur, et colore sanguineo, sive crudæ carnis, notabilis.

Var. γ folia, et membranæ terminalis divisuras, tenuiores et acutiussculas habet—Paulò altiùs crescit—*Fructificatio,* eadem ac in var. α .

Var. δ —*Folia* omnia et membrana terminalis longiora sunt quam in præcedentibus; porro ciliata; at ne vestigium quidem fructifi-

cationis nobis cilia visa sunt dare—*Ramuli* aphylli protensi sunt ut in var. β —*Lobi foliorum* et membranæ terminalis acuti admodum.

The first variety is found upon the coast of Norfolk, the second and third are very general, the fourth has been gathered by us only on the isle of Portland.

Mr. Hudson, from observing the branches at length terminating in a dilated membrane, classed the third variety with his *Ceranoides* in his division *fronde planâ aveniâ*. At the same time the fourth variety was placed in his division *foliis distinctis*; as, in good truth, that and all the other varieties, from their having so perfect a resemblance of petiolated leaves, ought to have been. Perhaps, strictly speaking, these petiolated leaves are only young branches, ending, like the larger ones, in a dilated membrane.

There is no danger of its being mistaken for any other *Fucus* in this division, being kept perfectly distinct by its nerveless dichotomous leaves, and terminal membrane.

In Gmelin's figure the tubercles are represented sessile, in our specimens they are all pedunculated; from the narrowness of the frond, that as well as Morison's figure is more applicable to our third variety than the first. The syn. of Morison quoted by Gmelin ought to be excluded. Whoever will take the trouble to consult Morison, will immediately find that he is speaking of a plant of an entirely different order.

The *cilia* on the edges of the fourth variety appear to be a sort of *lusus naturæ*, to be the rudiments of leaves or membranes, and to have no concern in the production of any thing relating to the fructification. In all our specimens the fructification is produced on the branches, and is always supported by a very short peduncle.

The colour of this *Fucus* varies—sometimes it is of a light red—sometimes it appears herbaceous and green—at other times it is found of a parchment colour, and even white, owing to its having been exposed to the sun when cast up upon the shore. In the second variety the base of the leaves and terminal membrane keeps its colour of blood or raw flesh in all exposures.

9. *FUCUS LIGULATUS.*

F. fronde planâ aveniâ sub-triplicato-pinnatâ, ramis ramulisque distichis, foliis lineari-lanceolatis spinoso-dentatis. Fl. Scotica, p. 946. pl. 29.—With. 3. p. 248.

F. herbaceus. Fl. Anglica, p. 582.

Inter rejectamenta maris apud Weymouth, Exmouth, et in Insulâ Portlandicâ, necnon apud Yarmouth in Norfolciâ.

Radix — *Frons* valde ramosa, pallidè virescens, tenuis admodum et pellucida, plana avenia—*Caulis* primarius rectus perpetuus, latiusculus, spinulis et ramis distichis divaricatis—Hi rami in ramulos sæpe multoties dividuntur, omnes ejusdem ac primarius naturæ et substantiæ—Tandem quasi in foliola abeunt lanceolato-lineararia, marginibus spinoso-dentatis—*Altitudo* 1—3 pedalis et ultra—*Fructificatio* hodie latet.

This plant grows usually in very deep water, and is to be met with only when the force of some current has separated it from its native rock. We never remember to have seen an entire plant with its root. The fragments which we have seen have been sometimes more than a yard in length, and branching out to a considerable extent. Mr. Lightfoot's figure (which is of a very small fragment) is executed with great fidelity. His description is very

good, except with respect to the expansion of the plant, which he confines to six or eight inches; his own figure represents it much larger. Large specimens extend to nearly or quite two feet, or even more.

Its green colour induced Mr. Hudson to call it *herbaceus*—Mr. Lightfoot's name *ligulatus* was prior, and is more characteristic; we have therefore restored it.

When carefully expanded it makes a very beautiful appearance. We have never seen any thing like fructification upon it. Its texture borders very closely upon that of *Ulva*, which we almost suspect it to be; but the spinosity of the leaves connects it with *Fucus*. It may serve perhaps as the link connecting these two genera. The main stalk produces all its branches, which are very ramose, in a distich order, and besides is beset with numerous but distant spines or subulate rudiments of branches. The last divisions, which from their appearance we denominate leaves, (and under which idea we refer this plant to the division *foliis unitis*,) are beautifully ciliated with minute spines or leaves, which are again also themselves ciliated.

It seems something extraordinary that none of the older botanists have noticed this plant.

10. FUCUS SILIQUOSUS.

F. fronde compressâ ramosâ; foliis distichis alternis oblongis; vesiculis pedunculatis oblongis articulatis mucronatis. *Buddle*, p. 15. n. 1. *Uvedale*, p. 1. n. 2. and p. 5. n. 1, 2. *Buddle and Vernon*, without fructification, p. 22. n. 3.

Gmelin, p. 81, t. 2 B. *Fl. Dan.* 106. *Act. Paris.* 1772 partie 2de, pl. 4. f. 22. l-m-n-o-p-q. in fructification—the root, f. 20, 21.

R. Syn. P. 48. *n.* 39. *Linn. Sp. Pl.* 1629. *Fl. Ang.* p. 574.
Fl. Scot. p. 921. *Withering,* 3. p. 236.

Habitat in rupibus et faxis marinis passim.

Radix, callus expansus, qui autem in plantis provectioribus sæpe conoideus, ligni instar durus—*Frons* cartilaginea valde ramosa compressa, ramis ramulisque distichis alternis, 1—4 pedalis, glaberrima—*Rami* ramulique modo valde distantes, modo conferti. Ad latera ramorum ramulorumque folia oriuntur, disticha omnia, plana, nervo medio obsoleteiusculo, oblonga, quæ mox siliquarum instar intumescunt—Ergo ante fructificationem, folia quasi jure suo appellentur, intumescencia autem vesiculæ—Ex his vesiculis quædam grandiores evadunt, articulatæ, cellulis 9—12 cavis vacuis. Aliæ minores ad apicem ramorum omnino solidæ, dissepimento medio longitudinali. Intus ad latera feminum minimorum congeries plurimæ—*Vesiculæ* omnes oblongæ, et mucronatæ, sive apice producto obtusiusculo—*Color* olivaceus.

There is no need of labouring the description of this plant, as it in fact has no rival; its pod-like leaves or processes being a peculiar distinction.

We were surprised to find at Weymouth large plants of this species thrown up by the sea entirely void of all fructification, or indeed any approaches to it; the leaves being lengthened to a very considerable degree, and exceedingly narrow and thin.

The processes which we call leaves, after some time thicken and swell, and assume the form of pods. We have examined a great number of them, and have always observed the generality of the older ones to be hollow, cellular, and void of seeds. Those placed towards the extremities of the branches are cartilaginous and solid, with

with a strong partition running up the middle, and clusters of seeds adhering to the sides of the pods on the inside. In the hollow cellular pods, traces of this dissepiment or partition are to be observed; one largish and several very small filaments running throughout longitudinally, and connecting all the cells. Whether these cavities arise from their having shed their seeds, or from the abortion of them, may be an object worthy of the attention of those who have an opportunity of watching them through the several stages of their growth. It is observable that the leaves, as they are called, have all a rib or nerve passing up the middle; when the fructification takes place and the leaf swells, this rib becomes a partition line or dissepiment.

The pods are very liable to be broken off by the force of the waves. The plant often assumes a very disguised form from this accident; oftentimes not a single pod or leaf remains throughout the whole frond. Here botanical experience assumes its due consequence.

II. FUCUS ABROTANIFOLIUS.

F. fronde filiformi-compressâ pinnatâ, ramulis extremis vesiculosis, vesiculis terminatis foliolis multipartitis obtusis. Herb. Linn.

Linn. Sp. Pl. 1629. Fl. Ang. 575.

Habitat in mari Anglico. Leosling.

Radix ———. *Frons* filiformis aliquantulum compressa, crassitie pennæ corvinæ, semipedalis—*Folia* pinnata sub-alterna, pro situ varia; inferiora scilicet simplicia, linearia, dentata; dein pauca pinnatifida; cætera ramosissima et supradecomposita segmentis filiformibus—*Folia* superiora vesiculosa sunt, vesiculis concatenatis, foliolis multi-

multipartitis obtusis terminatis—*Fruetificatio*, tubercula minuta in foliolis terminalibus, et in ipsis vesiculis feminifera.—*Color* recentis plantæ olivaceus, siccatæ niger.

This species has been involved in great doubt and obscurity: but the inspection of the Linnæan Herbarium, in which the actual specimen gathered by Leosling on the British coast is preserved, has entirely removed the difficulty.

The specific character and description given above were made from a young and vigorous specimen brought from the Mediterranean, in which all the leaves were whole, and had apparently all their most minute ramifications. That in the Linnæan collection, and from which Linnæus himself formed his specific character, is a much older one, in which the lower linear leaves and the fine of the upper ones are broken off; as is the case with most sea plants when long exposed to the action of the waves.

In the second Mantissa this species is referred to *Fucus capensis*, *Gm.* 157. *t.* 17. *f.* 1.; but certainly erroneously, as is evident from the Linnæan specimen before mentioned, than which nothing is more unlike *capensis*.

It differs from *barbatus* in having vesicles, and in some other particulars which are pointed out under that species. It agrees with *fœniculaceus*, in having frequently one or more leaves growing from the sides of the vesicles; but differs in having these leaves constantly obtusely terminated, whilst those of *fœniculaceus* are always subulate. It differs also from the latter in the shape of the lower leaves and in colour.

We have never met with this species in a growing state; but have described it as an English plant on the authority of Leosling's specimen in the Linnæan Herbarium, and from having seen it among
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the remains of Mr. Hudson's collection, now in the possession of
A. B. Lambert, Esq. F. L. S.

12. FUCUS BARBATUS.

F. fronde filiformi ramosissimâ, ramulis extremis tuberculatis,
tuberculis congestis foliolo subulato terminatis.

Fucus fœniculaceus. *Gmelin, p. 86. t. 2. A. f. 2.*

Fucus fœniculaceus. *Fl. Ang. 575. Withering, vol. 3. p. 238.*

Habitat in rupibus et saxis submarinis, in Devoniam. *Hudson.*

Radix ———. *Frons* teres filiformis 6—8 uncialis, crassitie pennam corvinam vix æquans, statim a radice ramosa, ramis iterum inordinatim ramosissimis, ramulis supremis tenuissimis tuberculatis — *Tubercula* aliquando solitaria, frequentissimè in formam ovalem congesta, haud raro suprema bifida; cuncta in juniore æque ac perfectiori plantâ foliolo subulato terminata, quod autem in senescenti frequenter deest — *Color* recentis plantæ lutescens, vel ex luteo rubescens, siccata nigerrimus.

After the account which has been given of *fœniculaceus*, it will not be surprising that this plant should also have been the subject of much error; and that it should have been described as bearing vesicles or air bladders; which has tended to confound it, not only with *fœniculaceus*, but also with *abrotanifolius* and *fibrosus*. What have been taken for vesicles, on the most careful examination with good glasses, evidently appear to be congeries of seed-bearing tubercles: and this is farther confirmed by the irregularity of their shape; for, though they are generally oval, they vary considerably in their proportional length and thickness, and some of the terminal ones are frequently

frequently bifid, representing in miniature the fruit-bearing terminations of *Fucus vesiculosus*.

The figure of Gmelin is so accurate, though it represents a single branch only, and not an entire plant, that it cannot be mistaken; and his description confirms our assertion of the want of air bladders, as he says, the vesicles consist of a congeries of tubercles appearing to be full of seeds.

We have never observed the terminating subulate leaves to be wanting in the perfect plants, though in old ones they frequently are, being broken off by the force of the waves; we have therefore adopted this as part of the specific character, to distinguish this species from *abrotanifolius*, which always has the branches terminated by a multipartite leaf with obtuse segments. It is farther distinguished from *abrotanifolius* by the want of vesicles, by being branched directly from the root, and by the branches and subdivisions growing without order; in the latter also the vesicles and fructification are observable on the upper branches only, but in this the tubercles are to be found on all the small ramifications. It is distinguishable from *fibrosus*, by its smaller size, its terminating fructification and want of vesicles; and from *fœniculaceus* and *concatenatus* of Linnæus, by its want of vesicles and its black colour when dried.

The quotation of Gmelin's accurate figure and description of this plant in *Syst. Nat.* and the erroneous synonyms given by Gmelin himself, are a sufficient apology for Mr. Hudson's supposing this plant the *fœniculaceus* of Linnæus; notwithstanding the mention of vesicles in the specific character, which are totally wanting in this species, might have led him to suspect some error.

We have not described the root; the specimens which have fallen under our observation not having any: but it is reasonable to conclude, that both this species and *abrotanifolius* adhere to the rocks by

some sort of callous expansion, as we know that such are the roots of their affinities *fœniculaceus* and *fibrosus*.

13. FUCUS ERICOIDES.

F. fronde filiformi ramosissimâ, foliis subulatis, terminalibus confertis arctè imbricatis, basi tuberculiferis. *Herb. Linn.*

Buddle, p. 18. n. 2. 19. n. 2. 5. Petiver, p. 40. n. 3.

Fucus erica marina. *Gmelin, p. 128. t. II. f. 2.—non bona. Linn. MSS.*

Fucus tamariscifolius. *Fl. Ang. 576. Withering, 3. p. 239.*

Habitat in rupibus submarinis in Insulâ Portlandiâ—In com.

Cornubiæ, Devonizæ, Eboraci.

Radix callus expansus crassus durus—*Frons* primo ortu dura lignosa teres, at frequentius ramis vi fluctuum abruptis, superficie inæquali. Haud mora ramosa fit ramis omnibus densè stipatis—*Rami* longiusculi in plurimos ramulos alternatim sitos dividuntur. Hi ramuli folia plurima alterna subulata gerunt infernè remotiuscula, supernè conferta arctè imbricata—Ad apicem ramulorum hæc folia basi extus tubercula exhibent, minuta, rotunda, glaberrima, vesiculas referentia, quæ fructificationem præstant—*Color* nigricans—*Altitudo* 3—9 uncialis.

Obs. Tubercula ad basin foliorum, foliis ipsis sub-duplo ampliora.

Mr. Hudson confounded our *F. ericoides* and *selaginoides* under the name *tamariscifolius*, and, imagining them to be one and the same, framed his description accordingly. We have spoken sufficiently of *selaginoides* under that article. *F. ericoides* is constantly distinguishable by its numerous branches growing close together in the manner of a shrub, and by its leaves alternate and somewhat re-

mote from each other at the base of the branches, but clustered together at the summit. These clustered leaves produce a small vesicle or tubercle on the outside of their base, not much larger than the leaf itself:—this proportion of the vesicle to the leaf should be constantly attended to, as it is a very striking mark of distinction from *selaginoides* in its most disguised forms. The leaves at the summit, clustered together with the tubercles at their base, resemble in some degree a bunch of grapes in miniature. The small branches in this species grow somewhat zigzag.

Dr. Withering is the first who separated *selaginoides* from *tamariscifolius* of Hudson. He gives us also Major Velley's remark upon the cærulean tints which are reflected from the branches. It always appeared to us a blue faint light, such as is often observable on oyster-shells, when the friction of the knife has touched upon a part loaded with nitrous particles. At times this light is very copious, and of course truly characteristic and ornamental: it is observable only when under water.

It adheres to rocks most strongly; no *fucus* having a much stronger organ of adhesion, or a tougher substance.

14. FUCUS GRANULATUS.

F. fronde filiformi ramosissimâ; debili; foliis subulatis, laxiusculè imbricatis, basi tuberculiferis; tuberculis contiguis.

Sp. Pl. 1629. *Fl. Dan.* 591.

Inter rejectamenta maris apud Yarmouth.

Radix ———. *Frons* ramosissima pedalis et ultra debilis, effusa, ramis alternis denuo confertissimis, foliis subulatis acutis brevibus, basi ad dorsum tuberculiferis—*Tubercula* subrotunda, minuta con-

tigua subimbricata, per extremos ramulos confita, basi foliorum vix majora—*Substantia* cartilaginea—*Color* recentis olivaceus, siccatæ niger.

F. granulatus, *ericoides*, and *selaginoïdes*, approach so near to each other, that it requires the utmost attention to keep them separate.—*Ericoides* is of low stature, erect like a little shrub, and very bushy; and the tubercles are clustered at the ends of the ramuli like grapes.—*Granulatus* and *selaginoïdes* are of tall and more infirm growth. Of these, *selaginoïdes* has its tubercles solitary, and somewhat distant, at the base of the leaves of the extreme branches; but *granulatus* has them contiguous, and set close all along the extreme branches, and even part of the greater branches. The leaves in all are subulate and acute, but vary in proportion to the size of the tubercle.—In *selaginoïdes* they are four times larger, in *ericoides* twice as large, and in *granulatus* not much larger. We have never seen it in a growing state, but have found it along with *ericoides* and *selaginoïdes* washed on the shore at North Yarmouth.

The leaves in all these species are very liable to fall off; in this state the fructification affords clear marks of distinction. *F. barbatus* also comes very near to *ericoides* when thus mutilated; but the branches are usually dichotomous and always entire, whereas in *ericoides* they are very ramose, and bent in somewhat an angular or zigzag direction.

15. FUCUS SELAGINOIDES.

F. fronde filiformi flexuosâ ramosissimâ; foliis subulatis remotiusculis; vesiculis foliorum superiorum basi innatis. *Herb. Linn. Buddle, p. 19. n. 1. & p. 39. n. 5.* Old specimens.

Fucus

Fucus abies marina. Gmelin, p. 83. t. 2. A. f. 1.

Linn. Syst. Withering, 3. p. 239.

Inter rejectamenta maris prope Weymouth, et apud Insulam Portlandicam mensibus Junio et Julio.

Radix —————. *Frons* sub-lignosa, dura, teres, erecta, ramosissima—*Rami* in ramulos plurimos flexuosos alternos abeunt—*Folia* omnia alterna, subulata, ascendente, sinibus obtusiusculis, superiora basi extus tuberculo inflato s. vesiculâ flavescenti, mucoplenâ, seminiferâ—*Folia* omnia remotiuscula nec densè stipata—*Fructificatione* absoluta, s. vesiculis dilatatis, folia ad apicem ramorum contigua videntur—*Color* recentis plantæ lutescens, siccatae niger—*Vesiculæ* autem vel siccatae sæpiùs flavescentes—*Altitudo*, *sesquipedalis et ultra*, Gmelin.

Obs. Vesiculæ s. tubercula ad basin foliorum, foliis ipsis sæpe plusquam quadruplo ampliora.

We have never had the good fortune to see this plant in a state of growth; only fragments thrown upon the shore have come to our hands. We can speak therefore only of the upper parts of the frond; we give the height and the substance from Gmelin.

The account which Gmelin gives of its growth seems rather extraordinary. His words are—‘ The branches arising from the main stalk produce a footstalk which bears an oblong vesicle; from this vesicle another footstalk proceeds, and again this footstalk is swelled with another vesicle, so that the branches make up a series of proliferous vesicles.’ We have an idea that Gmelin’s description is applicable to the unfolding of the frond, rather than the growth itself; for the leaves at the base of the little branches are without any vesicle at all—then not unfrequently after the branch has proceeded to the production of a vesicle, a barren leaf or two intervenes

venes before another vesicle occurs; but this intervention destroys his law of vegetation. However, it must be allowed that the terminal leaves are all loaded with a vesicle at their base, which vesicles as they are enlarged become contiguous.

The slenderness of its habit, its lax appearance, the zigzag growth of the branches (occasioned possibly by the protrusion of the leaves, which, after all, perhaps may be rather rudiments of branches than leaves, and thus occasion such revulsions), then the leaves being all alternate, ascendent, and remote to a certain degree from each other, and at the end of the branches loaded with a vesicle at the base, many times larger and broader than the leaf itself, keep it sufficiently distinct.

It appears to us that these leaves are in fact new branches, it being easy to trace those at the base of the branches into ramification. At the top of the branches where these leaf-like rudiments cannot go into farther division, there the vesicle is formed. Thus no part is useless; the plant is as much enlarged, and as fruitful, as the law of nature designed it.

16. FUCUS FOENICULACEUS.

F. fronde filiformi ramosissimâ; ramis sub-dichotomis; foliis subulatis æqualibus; vesiculis oblongis concatenatis innatis.

Herb. Linn. Petiver, p. 34. n. 4, 5, 6. Buddle, p. 15. n. 2, 3. & p. 39. n. 3.

Reaumur, Act. Gall. 1712. t. 3. f. 5. Linn. Sp. Pl. 1629.

Fucus concatenatus. Fl. Ang. 574. Fl. Scot. 923. Withering, vol. 3. p. 237. Vellej, t. 2. f. 1.

Habitat apud Weymouth Junio, Julio.

Radix callus crassus vix expansus—Frons spithamæa vel pedalis, teres

teres filiformis, statim in ramos plurimos dividitur—Hi rami alios ramos ramulosque similes inordinatim sitos protrudunt; ultimi vesiculas oblongas concatenatim dispositas, parum distantes, sæpè tuberculatas innatas habent, et foliis multipartitis subulatis terminantur; folia similia in ramulis et in vesiculis ipsis frequenter occurrunt—*Fruëtificatio*, tubercula minutissima in foliis multipartitis terminalibus, et in senescentibus etiam in vesiculis sita—*Color* brunneus vel subfuscus.

In no part of the vegetable system, has the introduction of the Linnæan Herbarium into England, and the free inspection of it which the liberal possessor permits for the benefit of science, been the means of detecting more errors than in the genus *Fucus*; and in no species of that genus is this more conspicuous than in the present. Without this authority, it would hardly have been credited by the British botanist, that the plant described by Mr. Hudson and the other English authors by the name of *Fucus concatenatus*, was in reality the *foeniculaceus* of Linnæus, than which nothing is more certain; and that the *concatenatus* of Linnæus, of which we have received specimens from the Mediterranean exactly corresponding with that in the Herbarium, is a very different plant, and has not hitherto, as we believe, been found on the British coast.

This species is branched immediately from the root, and these branches generally proceed throughout, but are each of them again divided and subdivided, the smaller branches having numerous oval vesicles, nearly contiguous to each other, resembling a chain, and terminated by a multipartite leaf, with subulate segments, which, when in fructification, are surrounded by minute tubercles. The vesicles are not always confined to the terminating branches,

but

but are sometimes observed on the others. In a young state they are regularly formed and naked; but when the plant is more advanced, they frequently grow larger, are irregular in their shape, and are often in part covered with tubercles, similar to those on the terminating foliaceous segments.

The distinctions between this, *abrotanifolius*, and *barbatus*, are mentioned under those species; but as it has been confounded with *concatenatus* of Linnæus, it may not be improper to point out in what they differ, notwithstanding the describing of the latter does not come within our present plan. In *fœniculaceus* the plant branches directly from the root; in *concatenatus* the principal stem is continued throughout—in the former the branches grow without order; in the latter they are more regularly opposite than in any other marine plant we have seen—the concatenated vesicles are larger and fewer in *fœniculaceus* than in *concatenatus*, and in the latter the vesicles are constantly naked, never having any tubercles upon them: the whole plant also, though perhaps longer, is much more slender, and more delicately formed in all its parts.

Whether *barbatus* Sp. Pl. *fœniculaceus* β Syst. Nat. be the plant we have called *barbatus*, as from the reference to Gmelin might reasonably be supposed, or whether it may be some varied appearance of this plant, it is impossible from the imperfection and uncertainty of the specimens so named in the herbarium to ascertain.

This plant is thrown up on the shore at Weymouth in May, June, and July, and but rarely after that time.

Obs. Since this article was written, young specimens of *fœniculaceus* and *concatenatus* have fallen under our observation; from which we are enabled to state, that in both species the first branches are

in the form of linear leaves, which branch into others, and these contracting at intervals become vesicles, the subdivisions forming the slender ramifications. Specimens of this appearance occur so rarely, that it was thought better not to alter the description, which applies to the more general habit of the plant, as it might only tend to mislead or confound the young botanist.

17. FUCUS FIBROSUS.

F. fronde filiformi ramosissimâ; ramis primariis sub-distichis; foliis filiformibus linearibusque; vesiculis sub-rotundis innatis. *Buddle*, p. 18. n. 4, 5. *Petiver*, p. 40. n. 5. *Morison*, *Hist. Ox.* iii. p. 648. t. 8. f. 17. *R. Syn.* p. 49. n. 45.

Fucus abrotanoides. *Gmelin*, p. 89—*baccatus*, p. 90. t. 3. f. 2.

Fl. Ang. p. 575. *Withering*, 3. 238.

Var. β *setaceus.* *Fl. Ang.* p. 575.

Foliis infimis sub-linearibus, cæteris setaceis.

Habitat nullibi copiosius quam apud Ilfracombe in Devonîâ.

Inter rejectamenta maris prope Weymouth.

Radix callus expansus—*Frons* ramosissima, infernè sub-compressa, scabra, dura, lignosa—*Rami* primarii alterni distichi, basi incrassati; duri et lignosi—*Rami* cæteri ramulique sparsi alterni numerosissimi, mox tenuissimi—Per hos ramos ramulosque, vesiculæ subrotundæ, modo solitariæ, sæpe concatenatæ videntur, omnes innatæ, glabræ, foliolo uno aut altero laterali brevissimo subulato erecto armatæ—In plantis adultioribus, basin versus, folia linearia plana nervo medio tenui—In plantis adultioribus junioribusque supernè folia omnia teretia, setacea aut sub-subulata, longitudine multùm variantia; modo uncialia, modo brevissima, pro habitu plantæ et staturâ—*Ramulorum* foliola brevia admodum, basi tumescencia, tuberculosa—*Altitudo* pedalis

lis—3-pedalis—*Color* lutescens f. ex flavescenti olivaceus ; post exsiccationem niger.

Obs. Folia omnia alterna, ante fructificationem longa sunt, et in ramos statim abeunt—Foliola tandem brevissima, subulata, basi tumida et tuberculosa—Vesiculæ, utut sese frondes quoad ætatem habeant, fortuito adsunt, aut, si fors tulerit, ut in β defunt—In utroque casu nihil fructificationis interest.

We have reason to think that there has been much confusion made by different authors with respect to this plant. In the first place, the figure of Morison is given with a fibrous root, with which we may venture to assert this plant was never seen. In other respects it is very good.

In the next place, Gmelin appears to have seen this plant only in the two extreme stages of its growth : in its younger, when the upper leaves are all entire and setaceous, as he characterises it under the name *F. abrotanoides* ; and in its oldest, when the finer leaves are all either for the most part broken off, or changed into branches ; when also the vesicles are considerably enlarged. Not having seen the intermediate gradation of its progress, we cannot wonder that he deemed his *F. baccatus* a distinct species. We would hold out this instance, among many others we could name, as a warning to naturalists how they describe from single specimens : they cannot be aware, and that more particularly in marine plants, of their true character from such a slight acquaintance.

Mr. Hudson having found different fragments of this plant, and concluding that they belonged to different species, called it in its finer and more delicate appearance *setaceus*, in its more diffuse one *fibrosus*.

We found *F. fibrosus* growing in great plenty on the rocky shore
near

near Ilfracombe. Few specimens were more than a foot high; but we have seen it at Weymouth thrown up, after storms, of great size, and well justifying Mr. Ray's apt comparison to roots of trees.

In a recent state it is of a yellow olive colour, but always turns black in drying. It is something extraordinary, that sometimes the bladders are wanting even in very old plants. The fructification is tubercles at the base of the shorter leaves, towards the end of the branches, something in the manner of *tamariscifolius*.

The *F. baccatus* of Gmelin is this plant in a very old state, and may be found not uncommon, thrown up on the pebbly beaches of Dover, Hastings, Weymouth, &c. The lower leaves are quite flat and broadish, and have a rib or nerve running up the middle.

We hardly know how to call Mr. Hudson's *setaceus* a variety, and mark it so only by way of including that species. All the gradations from the first setaceous state, to that in which Gmelin has figured it, are to be found constantly—the former when young or growing in shallow water near the shore; the latter when old and in deep water, not to be perceived in the extreme ebb of the tide.

In all stages of its growth, the lower leaves are more or less linear and flat, the upper ones filiform and setaceous. The bladders have usually one or two short subulate leaves growing upon their sides.

Obs. In general this plant has most numerous branches, and those crowded together; but we have seen it thrown up on the coast with very few and thin branches, so as to be distinguished only by persons who have well known it in its various stages: but here also the branches and leaves are always alternate, and usually distich. These are young plants not yet in fructification. At the ferry at the Isle of Portland, we found young dwarf plants, without bladders, with many branches tolerably close, all

distich and alternate ; and the main stems crowded with very small warty excrescencies. They were adhering to stones of a moderate size, sometimes loose.

18. FUCUS TETRAGONUS.

F. fronde simplici ensiformi basi rotundatâ ; stipite alato quadrangulari.

Fucus fimbriatus. *Gmelin, p. 200. t. 29. f. 1.*

Radix fibrosa—*Stipes* infernè teres nudus, mox tetragonus membranâ latâ membranaceâ, basi rotundatâ ornatus—Antequam membrana incipit, foliola s. frondium novarum quasi rudimenta distichè proveniunt—Hæc foliola circiter 12 aut plura, conferta, subcartilaginea sunt et enervia, pro magnitudine plantæ minora, longiora, 2—6 uncialia et ultra.

19. FUCUS TERES.

F. fronde simplici ensiformi basi attenuatâ ; stipite alato tereti compressiusculo.

Fucus alatus s. phasganoides. *Baub. Pr. p. 154.*

Fucus esculentus. *Fl. Scot. p. 938. t. 28.*

Omnia quæ priori et huic accidunt, præterquam quod in hoc membrana basi attenuata in latius crescit, et quod *stipes* intra membranam ne minimè quidem tetragonus, at teres et compressiusculus. Porro foliola ad basin membranæ, membranacea sunt nec cartilaginea. *Frons* in utroque maxima, longissima, modo pedalis, sæpè ultra humanam altitudinem—At *tetragonus* longè major evadit.

We are in doubt to which of these species we should apply the
term

term *esculentus*; for Linnæus regarded them both as the same, and accordingly refers to the descriptions of both of them indifferently. However, there are so many differences observable in them that we have ventured to separate them, and have named them from the leading mark of their distinction: the squareness or roundness of the rib or nerve when it becomes invested with the membrane.

In the first place, they are not found in the same place: the *tetragonus* is met with in the Isle of Man, where *teres* does not make its appearance; *teres* is found in the Isle of Anglesey, and in many places on the northern coasts of England and Scotland both east and west, where *tetragonus* has no place.

Tetragonus has a square stalk or rib—*teres* a roundish one; *tetragonus* has the base of the frond rounded and sub-cordate, as is expressed in Gmelin's figure—*teres* has it very much attenuated, as may be seen in Mr. Lightfoot's representation. In *tetragonus* the little leaves at the base of the frond are thick and somewhat cartilaginous—in *teres* they are membranaceous. *Tetragonus* is found growing above the low-water mark—*teres* always just within the low-water mark. *Tetragonus* is by far the greater.

We are much indebted to our valuable friend the Rev. Mr. Davies, Rector of Aber near Bangor, for his apprising us of the differences between these two species.

Gmelin with his usual sagacity supposed *tetragonus* to have a fibrous root; but his draftsman unfortunately has made it a solid one. There is an omission also of the leaves at the base of the frond.

Mr. Lightfoot, who met only with *teres*, describes it with a square rib. He was led into this error most probably from examining only dried specimens: in drying, the stalk becomes flat, and in that state is not distinguishable from *tetragonus*.

Bauhin's description is very satisfactory.

Both species are eaten, as indeed are other *Fuci*.

Tetragonus is found on the rocks in the Isle of Man; *teres* on the rocks out at sea near Holyhead in the Isle of Anglesey.

20. FUCUS ALATUS.

F. fronde membranaceâ tenerrimâ ramosâ subdichotomâ.

Herb. Buddle, p. 12. n. 2. 6. Petiver, p. 25. n. 4. Gmelin, p. 187. t. 25. f. 1, 2. Fl. Dan. t. 352. R. Syn. p. 44. n. 20. Linn. Mant. 135. Fl. Ang. p. 578. Fl. Scot. p. 951. Withering, vol. 3. p. 243.

Habitat in rupibus, faxis et tignis submarinis passim.

Racix callus expansus—*Caules* plurimi, omnes alati, ab eadem radice oriuntur, qui sub ipso ortu ramosi fiunt, et sæpius dichotomi—*Substantia* omnino tenera—*Ramuli* distichi alterni, et præ membranâ per totam plantam connexâ, decurrere videntur—Apices ipsi ramorum ramulorumque a tuberculis omnino immunes; variant integri et bifidi, obtusi et acutiufculi, pro ætate et loco—*Fructificatio*, tubercula parva rotunda apicem ramulorum versus nervo adhærentia—*Color* omnino amœnissimus, modo virescens nervo rubro, modo omnino ruber.

Rami variant latitudine $\frac{1}{4}$ lin.— $\frac{1}{2}$ unciales et ultra—*Altitudo* 1—5 uncialis.

Our specific description is fully sufficient to distinguish this plant; for no other in this division has a thin membranaceous pellucid substance. Its beauty makes the most incurious observer notice it.

21. FUCUS SERRATUS.

F. fronde dichotomâ ferrato-dentatâ, apicibus planis tuberculatis obtusis. *Herb. Linn. Buddle, p. 8. optima. Petiver, p. 28. n. 1. Uvedale, vol. 1. p. 2. n. 2. and p. 3. Morison, Hist. Oxon. iii. f. 15. t. 9. f. 1. R. Syn. p. 42. n. 7. Aët. Paris. 1711. pl. 9, 10, et 1712 partie 2de, pl. 3. f. 1, 2, 3, 4, 5, 7, 9. Linn. Sp. Pl. 1626. Syst. Fl. Ang. p. 576. Fl. Scot. 902. Withering, vol. 3. p. 241. Stackhouse, Ner. Brit. p. 1. t. 1.*

Habitat in rupibus et faxis submarinis passim.

Radix callus expansus, attamen nervi quidam supernè extant, quasi ex fibris coadunatis constaret—*Frons* pedalis bipedalis, plana, alata, dichotoma, obtusa, marginibus profundè argutèque ferratis—Per totam paginam puncta prominula sparsa—Apices obtusi, eroso-dentati plani, tuberculati, tuberculis plurimis confertis, prominulis—*Color* olivaceus—*Substantia* cartilaginea.

Frons variat ramosa et ramosissima; argutè et crenato-ferrata; lata et angusta, at semper ferrata, apicibus obtusis planis tuberculatis.

There can be no difficulty in determining this species, in whatever stage of its growth it may be found. The singularity of its root, having nerves or fibres standing out above the surface of the *callus*, thus connecting the solid and fibrous rooted *Fuci*, the edges being constantly ferrated, and the ends of the branches plain and not swelled, are marks by which a child may distinguish it. This species never has bladders.

The plate in *Aët. Paris. 1712*, which we have referred to, shews the plant in all the stages of its growth.

Little points are observable on the membranous parts of all the branches. Nothing characteristic (as we have observed in our preface) can be drawn from them; for they are alike observable upon

upon its affinities *vesiculosus*, *spiralis*, and *ceranoides*. Indeed these four species seem from their texture and habit to form a distinct family, although the artificial system which we have adopted, necessarily includes others extremely dissimilar in those respects.

22. FUCUS VESICULOSUS.

F. fronde dichotomâ integerrimâ, vesiculis innatis axillaribusque, apicibus tumidis tuberculatis acutiusculis. *Herb. Buddle*, p. 4. *Petiver*, p. 32. *Uvedale*, vol. I. p. I. n. I. & p. 5. n. 1, 2, 3. *R. Syn.* p. 40. n. 4. *Act. Paris.* 1772, partie 2de, pl. 3. f. 6. 10. 11, 12, 13.

Fucus Quercus marina. *Gm.* p. 60.

— vesiculofus. *Linn. Sp. Pl.* 1626. *Fl. Ang.* p. 576. *Fl. Scot.* p. 904. *Withering*, vol. 3. p. 241. *Stackhouse*, *Ner. Brit.* p. 4. t. 2.

β. *Divaricatus*—vesiculis axillaribus dilatatis, axillis divaricatis. *Uvedale*, vol. I. p. 4. *Mor. Hist. Oxon.* iii. 647. f. 15. t. 8. f. 5.

F. divaricatus. *Linn. Sp. Pl.* 1627. *Syst. Fl. Scot.* p. 909.

F. vesiculofus γ. *Fl. Ang.* p. 577. *Withering*, vol. 3. p. 242.

γ. *Inflatus*—fronde apicem versus vesiculoso-inflatâ. *Buddle*, p. 5. n. 2.

F. inflatus. *Fl. Scot.* p. 910. *Smith, Icones Plant. rar. fasc.* 3. t. 75.

δ. *Acutus*—fronde apicibus productis lanceolatis. *Buddle*, p. 4. n. 3.

ε. *Foliaceus*—ramis proliferis, ramulis obovatis. *Buddle*, p. 5. n. 4.

ζ. *Volubilis*—fronde contortuplicatâ. *Buddle*, p. 7. n. 4, 5.

F. volubilis. *Fl. Ang.* p. 577.

Habitat in rupibus et faxis submarinis frequens. ζ prope Farnbridge ferry, Essex. *Buddle*.—In *Æstuario Cicestriensi*. *Ray*.

Radix callus expansus—*Frons* pedalis, bipedalis, plana, alata, dichotoma, marginibus integerrimis, ramis sterilibus obtusis—Per totam paginam puncta prominula sparsa—*Apices* valde tumidi ovati acutiusculi (in δ lanceolati acuti), tuberculati, tuberculis plurimis confertis prominulis—Per totam frondem *vesiculæ* duplici serie innatæ; quædam etiam solitariæ ad axillas—*Color* olivaceus—*Substantia* cartilaginea.

Var. β . Ramos ad dichotomias valde divaricatos habet, nimirum præ vesiculâ axillari dilatatâ, vel forsan præ duabus vesiculis coadunatis—Cætera ut in α .

Var. γ . Rami ex casu quodam, sive forsan morbo inflari videntur, quasi hydropico.

Var. δ . Omnia habet ut *var. α* , præterquam quod apices lanceolati acuti, at in eâdem plantâ, nonnunquam apices hi lanceolati, illi ovati acutiusculi.

Var. ϵ . Ramis vi fluctuum abruptis, quò injuriam reparare queat, ramulos plurimos confertos obovatos plerumque emittit, adeò ut vix varietas dici potest.

Var. ζ . Frons contorquetur adeò ut non facilè explicari potest—Cætera cum α habet communia.

The various authors who have written upon the *Fuci*, have very unwarrantably divided the varieties included in the denomination *vesiculosus*, into numerous species; but nature has shewn the true limit: the appearance of bladders in the frond is its unerring characteristic. By this mark it becomes separated from *ferratus*, *spiralis*, and *ceranoides*—the size and situation of these bladders are not sufficiently constant to constitute different species.

1. In the first variety the vesicles are ranged on each side of the rib throughout the frond, and also at the axillæ. The frond itself varies in having its branches from a quarter of an inch to a full inch in breadth, with edges either plane or undulated as in *spiralis*. The ends of the branches when in fructification are swollen and somewhat acute.

2. The variety *divaricatus* is remarkable for having the bladders in some of the axillæ (for it is by no means constant in all) extremely dilated, as if two vesicles had been confluent into one; in consequence the branches fork off wider than usual, and become divaricated. We have not observed this variety in fructification: in Southampton river we have seen it somewhat twisted.

3. The variety *inflatus* is occasioned by a disease. By some means or other a body of air is introduced between the two coats of the frond, and thus gives it a bladder-like appearance. That it is accidental is evident, from its not happening usually in more than one or two branches in any given plant.

4. The variety *acutus* we so call from the lanceolate terminations of its branches. The same plant, however, occasionally furnishes lanceolate terminations, and others somewhat bluntish.

5. We can scarcely call *foliaceus* a variety; it is merely a plant which, in the vigour of its growth having been broken off by some violence, endeavours to repair itself in an irregular manner, producing clusters of new branches resembling obovate leaves. These are principally from the broken extremities; but they are also found on the sides, and even upon the expanded root. As in *ceranoides*, this proliferous tendency does not take place unless the membrane is torn off. It differs from the first variety in no other particular.

6. This is the *volubilis* of Mr. Hudson. It cannot however be called a distinct species; for its form is the same nearly as the first,
only

only it is extremely twisted: however, the contortion of the frond in *Fuci* is no character of distinction, as occasionally it is seen in all the varieties above mentioned. The *volubilis* of Linnæus is not a British plant.

He who would wish for farther information, would do well to consult Gmelin, Lightfoot, and others, who have written largely upon the subject.

Its true and constant character is vesicles on the branches, and at the axillæ of the dichotomies.

The figure of Morison *f.* 15. *t.* 8. *f.* 10, as quoted by Gmelin to his α , and by Hudson to his variety β , belongs to that variety of *spiralis* which has plain and entire margins, and not to *vesiculosus*. The synonyms of Gmelin are to be received with great caution: he has fallen into many mistakes.

In *Buddle's Herbarium*, *p.* 7. *n.* 4, 5. are specimens of *vesiculosus* extremely twisted. They are the *spiralis* or *volubilis* of Mr. Hudson, not of Linnæus and Mr. Lightfoot. There is a note subjoined, mentioning, that they were gathered near Fambridge ferry in Essex. They are our last variety, if indeed any exact limit can be drawn between that and the first; for, as we have already observed, contortion seems accidental in this species.

23. FUCUS SPIRALIS.

F. fronde planâ dichotomâ æquali, apicibus tumidis tuberculatis obtusis.

Var. α . *undulatus*—ramis margine sub-undulato, apicibus obtusissimis. *Herb. Linn.* *Buddle*, *p.* 6. *n.* 2. *R. Syn.* *p.* 41. *n.* 5. *Fl. Dan.* *t.* 286. *Linn. Sp. Pl.* 1627. *Fl. Ang.* *p.* 577. *Fl. Scot.* *p.* 911. *Stackhouse, Ner. Brit.* *p.* 10. *t.* 5.

Var. β . *integer*—ramis margine integerrimo, apicibus ovatis obtusiusculis. *Buddle*, p. 6. n. 1. *Donati Adriatic*. p. 34. t. 3. *Morison*, *Hist. Ox.* 3. f. 15. t. 8. f. 10.

F. *spiralis* γ . *Fl. Scot.* p. 912.

F. *vesiculosus* β . *Fl. Ang.* p. 577. *Withering*, vol. 3. p. 242.

Habitat in rupibus et faxis marinis.

Radix callus expansus—*Frons* 4-uncialis dodrantalis et ultra, alata, infernè sæpius membranis orba—*Rami* in α latiores, marginibus undulatis, apicibusque tumidis et obtusis—in β angustiores, marginibus integerrimis, apicibusque valdè tumidis ovatis, et nunquam acutiusculis—*Habitus* F. *vesiculosi*, at vesiculis omnino caret—*Modo* spiraliter contorta, modo omnino plana—*Color* olivaceus—*Substantia* membranacea.

Fucus spiralis has entirely the habit of *F. vesiculosus*. It is however readily distinguished from it by its being entirely free from bladders. If there should be any danger of confounding it with *F. ceranoides*, that difficulty may be avoided by observing, that in *spiralis* the ends of the branches are very much swelled and obtuse—and in *ceranoides*, they are but slightly tumid, and extremely acute.

Our first variety exactly accords with Linnæus's and Mr. Lightfoot's specimens. The margins of the branches appear somewhat undulated. The lower parts of the plant are apt to lose the membrane; neither does it usually make any attempt to repair the injury, as *vesiculosus* and *ceranoides* do: the ends of the branches are not so very tumid as in the var. β . The branches towards the top of the plant where the membrane is entire, are from $\frac{1}{8}$ to $\frac{2}{3}$ of an inch broad. In our var. β , the branches have their margin entire. The membrane of the lower parts of the plant is alike torn off by the violence

violence of the waves: the branches, where entire, are usually something more than $\frac{1}{4}$ of an inch broad—the ends of them are much swelled, and not quite blunt. This variety gives much trouble in drying, owing to the great quantity of mucilage in the ends of the branches: when dry, the ends often appear more acute than they are in their fresh state.

Ray mentions it as being very common near Chichester. We have found it frequently in several places on the south coast.

We cannot help remarking upon the name of this plant. One would imagine that it was constantly and singularly spiral: that is by no means the case; for it is often found perfectly plain. All the varieties of *vesiculosus* occasionally affect a spiral growth: the diffuse *divaricatus* is not exempt from it—so that the name is not exclusively applicable to this species. It is known most surely by its extremities being swelled and obtuse, and being free from bladders. These are its constant distinction: its spirality is accidental.

24. FUCUS CERANOIDES.

F. fronde planâ dichotomâ integerrimâ æquali, apicibus tumidiusculis tuberculatis lanceolatis. *Herb. Linn. Buddle, p. 6. n. 3. Buddle & Vernon, p. 21. n. 4.*

F. filiformis. *Gmelin, p. 72. t. 1. A. f. 1.*

F. ceranoides. *Linn. Sp. Pl. 1626.*

F. linearis. *Fl. Ang. p. 578.*

F. distichus. *Fl. Scot. p. 912. Withering, vol. 3. p. 242.*

Habitat in rupibus et saxis submarinis prope Christchurch in agro Hantoniensi.

Radix, callus parvus expansus—*Frons* 3-uncialis—sesquipedalis, alata, angusta, plana, dichotoma, vesicularum expers; ab ipso ferè ortu

ortu ramosa fit, rami omnes multoties dichotomi, apicibus patentibus lanceolatis acutis—*Fruëtificatio*, tubercula conferta in ipsis apicibus sita.

Obs. *Frons* denuò infernè membranâ alatâ sæpius vi fluctuum orba est—Inde, quo injuriam citius, pro effoëtis quasi viribus, reparare queat, ramulos plurimos, breves, distichos, foliorum æmulos, emittit—Margines ramorum per totam plantam semper integerrimi
C *olor* olivaceus.

This plant is not to be found so generally as most of this order. It is very frequent at Christchurch, and indeed more common there than *vesiculosus*. It is most readily distinguished from *vesiculosus* by its having no bladders, by its narrow form throughout, and by the sharp forked termination of its branches: these two last circumstances serve to distinguish it very effectually from *F. spiralis*. Although we lay some stress upon the narrowness of the branches, yet it must not be understood, that we are always to have that circumstance to direct our judgment; for sometimes it is to be met with, with branches as broad as the narrower ones of *vesiculosus*—and in this case oftentimes not only the points of the branches, but the two last dichotomies, are entirely loaded with clustered tubercles. The points of the branches are always very acute.

We have no hesitation in pronouncing this the *ceranoides* of Linnæus. We have been so long accustomed to call the *crispus* of Linn. by this name, that it may seem grievous to some to have so apt an appellation totally changed: however, they must consider that the having continued long in an error is no justification for having done so; and they should rejoice, not regret, at gaining more perfect knowledge.

This plant has been thought by some, particularly Mr. Lightfoot,
to

to be the *distichus* of Linnæus. From examining the Linnæan Herbarium, and from Murray's description of *distichus* in the *Syst. Nat.* we are convinced that it is not a native of Britain. The *distichus* is quite thin and herbaceous—the *ceranoides* always membranaceous, and of a firm texture.

The branches have numerous small dots in rows on each side of the rib or nerve, as happens in *serratus* and *vesiculosus*: it varies in height from three inches to nearly, or perhaps quite, two feet.

As the plant grows old, it loses the membrane of the whole lower part of the frond. In this case it has the property of putting forth new branches, which, growing close to each other, and from their multitude not very large, give the plant a pretty fringed appearance. Before it has lost the membrane, this proliferous quality does not make its appearance.

Mr. Lightfoot's description mentions its being only a few inches in height. It is very probable that in certain situations, and especially when remote from fresh water, it may be of more humble growth.

25. FUCUS SACCHARINUS.

F. fronde simplice ensiformi. *Herb. Buddle, p. 21. Petiver, vol. 1. p. 15. Act. Naturæ Curiosorum, vol. 8. p. 450. t. 9. f. 2. Gmelin, t. 28.*

Var. β . *bullatus*—fronde bullatâ marginibus undulatis. *Buddle, p. 22. Petiver, vol. 1. p. 16. Uvedale, vol. 1. p. 14, 15. Act. Paris. 1712. p. 29. t. 3. f. 4. Gmelin, t. 27.*

Habitat in rupibus et faxis submarinis passim.

Radix fibrosa—*Frons* modo solitaria, modo gregaria; nempe aliquando.

quando frondes plurimæ satis distinctæ (nam reverà quæque suâ radice nititur), at radicibus invicem implicatis, ex eodem loco oriuntur—Porrò frons stipitata—*Stipes* teres, magnitudine et altitudine pro ætate et loco variat—In junioribus fili instar tenuis brevissimus; in adultioribus digiti ferè crassitie, pedalis—Frons ipsa plana avenia ensiformis, pro ætate brevissima aut longissima, angusta aut lata, membranacea aut cartilaginea variat—*Color* fordidè viret.

Var. β . *Radix et stipes* ut in var. α —*Frons* marginibus crispis undulatis, et præterea sæpe disco rugoso sive bullato-sinuoso—Sinus mucro repleti sunt, et femina plurima nuda, ex Gmelini sententiâ, mucro obtecta s. recepta continent. Hæc femina nos non vidimus.

We have spoken sufficiently of this species under our article *bulbosus*, particularly of the arrangement of these varieties.

The second variety here described is supposed by Mr. Lightfoot to be the plant in its perfect or fructifying state. As little is known of the fructification of sea-plants, we rather for the convenience of description place it last.

Reaumur observes, that he had found upon this species what he calls flowers (*fleurs composées de filets courts*) about ten or twelve on a plant, but no seeds.

26. FUCUS DIGITATUS.

F. fronde palmatâ laciniis ensiformibus; stipite tereti; radice fibrosâ. *Herb. Buddle*, p. 24. n. 1. *Petiver*, p. 18. n. 1.

Fuco giganteo. *Imp. Hist. Nat.* p. 741.

Fl. Dan. t. 392. *Fl. Norweg. par.* 1. t. 3. f. 1. *Fl. Ang.* p. 579. *Fl. Scot.* p. 935. *Withering*, vol. 3. p. 244. *Stackhouse*, *Ner. Brit.* p. 5. t. 3.

Habitat in rupibus submarinis frequens.

Radix ut in *F. saccharino* fibrosa—*Frons* stipitata—*Stipes* teres, uncialis, pedalis, bipedalis, tenuis, aut crassus pro ætate et loco. *Frons* ipsa membranacea, cartilaginea, in lacinias ensiformes quatuor, sæpe in plurimas dividitur, omnes planas avenias acutas—*Altitudo* in adultioribus, ulnaris et ultra—*Color* fordidè viret—*Fructificationem* nondum vidimus.

27. FUCUS BULBOSUS.

F. fronde palmatâ laciniis ensiformibus, stipite plano; radice inflato-bulbosâ. *Act. Paris.* 1712. p. 21. t. 1. f. 1.

F. palmatus. *Gmelin,* p. 202. t. 30.

F. bulbosus. *Fl. Ang.* p. 579.

F. polyschides. *Fl. Scot.* p. 936. *Withering,* vol. 3. p. 244. *Stackhouse, Ner. Brit.* p. 6. t. 4.

Habitat in Insulâ Portlandiæ—in littore Cornubiensi.

Adhæret rupibus fibris, quæ singulæ in callum minutum expansum desinunt—*Frons* stipitata—*Stipes* planus, basi inflato-bulbosâ (quæ radicem bulbosam cavam refert) tuberculosâ, quasi ex rudimentis frondium novarum, magnitudine ab ovo motacillæ usque ad infantis caput, sub-tortuosus, marginibus infernè crispo-undulatis, in adultis pedalis et ultra—Hic *stipes* in frondem abit planam aveniam, in lacinias plurimas divisam, ensiformes acutas—*Color* ut in præcedentibus fordidè viret—*Fructificatio* latet—An tubercula quæ ex stipitis basi enascuntur, fructificationis receptacula? Videant autoptæ—*Altitudo* variat usque ad quinque ulnas.

The *F. digitatus* and *bulbosus* seem extremely alike; but, to an attentive observer, no two plants can differ more. In *F. digitatus* the

stalk is round—in *bulbosus* perfectly flat: in *digitatus* it is simple throughout—in *bulbosus* it is inflated at the base, whence it resembles a hollow bulbous root. This apparent bulb is covered with short pezizi-form excrescences, which authors have imagined to be rudiments of other plants. However, as this *fucus* is always found solitary, we would suggest the idea, that they may be receptacles of fructification. We rather dwell upon this idea, because in the younger plants there is no appearance of tubercles. The stalk in *bulbosus* is sometimes slightly twisted, and just above the base has its margins thinnish, and extremely curled or undulated: in *digitatus* the stalk is simple throughout; it has no inflation at the base, and is entirely free from all excrescences whatsoever. The divisions of the frond, except that they are rather more numerous in *bulbosus*, are in both alike, as to their sword-like, or rather scymetar-like shape, and, according to their age, of a membranaceous, cartilaginous or leathery texture. The colour in both is a dirty green.

There is such a similarity in the habit, texture, and root of *saccharinus*, *digitatus*, and *bulbosus*, that we cannot but be strongly inclined to think the fructification is alike in them all. They seem to form a separate family. It was this idea which induced us chiefly to look upon the *bullated saccharinus* to be the variety, and the smooth one so like *bulbosus* and *digitatus*, to be the principal. All these species have mucus enough to constitute a receptacle for the seeds or fructification; so that that consideration need not force us to have recourse to the bullated variety of *saccharinus* to account for the source of propagation of that species. If there were bullated varieties of *digitatus* and *bulbosus*, we might in that case allow that the bullated variety was the perfect plant; but as that is not the case, and as in two of these species the fructification is latent in the smooth frond,

we have every reason to think that it is so in the smooth variety of *saccharinus*.

Specimens of *F. digitatus* have been gathered at Harwich with swellings on the lower part of some of the segments, and both *digitatus* and *bulbosus* have been observed in Cornwall with swellings on the upper part of the segments, as represented in *Fl. Dan.* Whether these swellings were mere inflations, or full of mucilage, was not observed; however, no seeds were observed in them. The same sort of swellings appear in *saccharinus var. α*, but no seeds have been discovered. However, all this confirms us in our idea of the analogy between all these plants, and of the propriety of calling our *saccharinus var. α* the perfect plant, and *bullatus* the accidental variety. We are thus also more strongly persuaded to look upon the mucus contained in the sinuosities merely as the natural consequence of such cavities in an extremely mucilaginous plant.

Both these species grow to a vast size, from one to nearly five yards.

Messrs. Fougereux de Bondaroy and Tillet, in their very ingenious treatise upon marine plants, *Act. Paris. 1772*, have confounded *digitatus* and *bulbosus* together, alleging that the *stipes* is both round and flat.

28. FUCUS LACERATUS.

F. fronde membranaceâ tenerrimâ ramosâ; ramis ramulisque sublinearibus apice obtusis.

F. laceratus. Gmelin, 179. t. 21. f. 4.

F. endiviæfolius. Fl. Scot. p. 948. t. 32.

F. crispatus. Fl. Ang. p. 580. Withering, vol. 3. p. 247.

Var. β papyraceus—ramis ramulisque tenuioribus sub-sinuatis.

Var. γ laciniatus—ramis dilatatis palmatis, ramulis sublineari-
bus. *Fl. Ang.* p. 579. *Fl. Scot.* p. 947. *Withering*, vol. 3,
p. 245.

Obs. Variant omnes marginibus crispo-undulatis, laciniatis, inte-
grisque.

Habitant α et γ in rupibus, faxis et plantis submarinis satis fre-
quentes—*Var. β* apud Ilfracombe in com. Damnoniensi.

Adhæret rupibus, faxis, plantisve submarinis callo minuto; proximè
fit furculosa: furculi iterum, quâ fors tulerit, fortiter adhærent, et
novæ fiunt plantæ—Inde rarò simplex et solitaria; at quasi frons re-
peret, et furculos confestim emitteret, numerosa—Ab ipso ortu, *frons*
membranacea est, rubicunda, sanguinea, tenerrima—Haud mora in
ramos abit variè divisos—*Rami* ramulique lineares, alterni, obtusi—
Fructificatio, tubercula rotundiuscula feminibus, ut videtur, repleta,
propter latera apicesque ramorum ramulorumque sita—*Altitudo*
frondis 1—5 uncialis—Pro ætate et loco ramuli longiusculi aut
breves; lineares, aut figurâ quasi nondum perfectâ, ovati, oblongi,
pauciores sive plurimi.

Var. β omnia cum *var. α* communia habet, at ab omni parte
minor et tenuior—In ramulos plurimos sæpius dividitur—Hi autem
non rarò perbreves sunt, adeo ut rami sinuosi potius quam ramosi
videntur—Omnia autem hæc ex solo natali oriuntur.

Var. γ ad omnem divisuram frondis dilatatur—Inde divisio in
ramos plurimos fit, in palmæ modum extensos—*Color, substantia,*
ramulorum forma, et fructificatio eadem ac in *var. α* et *β*.

Substantia in omnibus plerumque tenerrima; est ubi firmior et
durior occurrit. *Fronde* nonnullæ, quandò rupibus solitariae enas-
cuntur, stipite brevissimo compressiusculo nituntur.

We have not departed from Mr. Hudson's arrangement of these
plants.

plants without repeated examination of their several properties. The fructification is the same in all the varieties: the only difference to be stated is, the enlargement of the var. γ at all its divisions, and, at those divisions, the palmated form in which the branches seem to be produced. But this division is by no means constant in any one plant which may be found; some of the branches being dilated and palmated, and others linear, as in the var. α , in the self-same plant.—This then destroys all specific character taken from that circumstance. This dilated variety oftentimes is somewhat dichotomous, but the branches are always more or less linear and obtuse. The var. β in some stages of its growth approaches very near to *dentatus*; but it is sufficiently distinct by the branches being obtuse. All these varieties have the edges of the branches perfectly entire, or most beautifully fringed as it were with rudiments of branches, too closely set for any one of them to arrive at any material size. Tubercles are sometimes found in these little rudiments.

The var. β grows in great abundance at Ilfracombe in the north of Devonshire, where it creeps round the edges of the basons in the rocks, and makes a beautiful appearance.

This *fucus* attaches itself not unfrequently to other *fuci* and the coarser *confervæ*, and very commonly to the *corallina officinalis*. When it attaches itself to plants, it seems to cling round them, and soon totally invests them if they are of small size.

When it grows single on rocks, it appears to have a very short and thickish compressed stem.

Its delicate texture and beautiful red colour catch the eye of the most incurious observer.

The fructification is tubercles, or warty clusters of seeds, scattered along or rather just within the edges of the branches.

As Linnæus has taken no notice of this plant (*F. corymbiferus* of Gmelin is his *cristatus*), we necessarily recur to the name by which Gmelin originally set it forth.

29. FUCUS DENTATUS.

F. fronde membranaceâ tenerrimâ ramosâ alternatim pinnatifidâ ; ramulis linearibus apice incis, lacinulis acutis. *Herb.*

Linn. *Morison, Hist. Oxon.* iii. *f.* 15. *t.* 8. *f.* 5. bona.

Linn. Syst. Fl. Ang. p. 582. *Fl. Scot.* p. 952. *Withering, vol. 3,*
p. 248.

Radix callus—Sub ipso ortu frons ramosa fit—*Rami* alternatim pinnatifidi, sinibus ramulorum obtusiusculis—*Ramuli* breves lineares, nonnunquam etiam pinnatifidi, apicibus semper s. in lacinulas plerumque acutas divisis—*Substantia* membranacea tenera admodum et avenia—*Color* ruber—*Altitudo* 2—4 uncialis—*Fructificationem* nondum vidimus.

Obs. Oculo bene armato, ramuli, præsertim ad sinus ramulorum, ciliis brevissimis obsiti videntur.

We have not admitted the synonym of Gmelin's *corymbiferus*, although adduced by the authority of Mr. Hudson and Mr. Lightfoot. We have little doubt but that is the *F. cristatus* of Linnæus. It certainly is not *dentatus*.—That is a large plant, growing a foot high or more : *dentatus* rarely exceeds five or six inches.

We lament extremely our utter inability to say one word about the fructification.

Morison's figure is excellent. There is no danger of confounding it with any of its affinities. The only one which at all approaches it is the *laceratus* var. *papyraceus*; but the ends of the branches in that variety are entire and obtuse—in this divided,
and



F. jubatus.



F. gigasternus.

M.S.G. del.

and the segments for the most part acute. As the plant increases in stature, the sharp terminations of the branches grow broader, and appear somewhat truncated. In this state they are preparing for a fresh division, and each blunt segment becomes divided into two acute ones; and thus the increase of the plant is carried on.

The great point of distinction to be depended upon, is the ends of the branches being divided into acute segments. In Mr. Lightfoot's collection we saw several specimens whose frond had at the base a faint nerve, exactly like what is observed in *F. alatus*. The nerve, however, in these soon terminates; but in some specimens, with which our friend Mr. M'Leay has favoured us, a faint nerve appears to run through all the branches. They were gathered near John o'Groat's house in Caithnessshire.

This anomaly is apt to perplex the young botanist: the same irregularity is observable in *F. rubens*.

30. FUCUS BIFIDUS. TAB. 17. FIG. 1.

F. frondibus membranaceis dilatatis bifidis, segmentis divaricatis obtusis; tuberculis marginalibus distantibus. *Fl. Ang. p. 581.*

Withering, vol. 3, p. 247.

Habitat in rupibus et faxis marinis apud Cromer in Norfolciâ.

Adhaeret faxis et lapillis radice fibrosâ—*Fronde* a radice plures, a tenui principio statim latefcentes; singulæ 1—2 unciales, membranaceæ, tenerrimæ, lætè rubræ, pro altitudine bis, 3—4 bifidæ, segmentis 1—3 lineas latis, sub-divaricatis, unde cuneiformes apparent; terminationes plerumque obtusæ, rarò acutiusculæ—*Fructificatio*, tubercula sphærica, parva admodum, atro-purpurea, rara, distantia, in ipso margine frondis, seminibus minutissimis repleta.

This

This species, which does not appear to have been noticed by any author before Hudson, approaches nearest to young specimens of our *laceratus* β . It appears however to differ in its much more humble growth, and the more tender and delicate substance of the frond, which is perfectly entire at the margins, never having that jagged appearance observable on the margins of the other.

The divisions are never palmated, but constantly dichotomous, often divaricated, and having the dichotomy sometimes three and even four times repeated, when the frond rises to two inches or more in height; although in the *Fl. Ang.* they are said to be once or twice only.

The fructification, which seems to have been unknown to Mr. Hudson, is very particular; consisting of small tubercles partly immersed in the very margin of the frond, whence they project somewhat more than half their diameter, always solitary, and considerably distant; so that there are seldom more than three or four on any one frond. The plant is of a pale purplish red, extremely thin and delicate; the tubercles dark purple, and when ripe turning almost black.

It adheres by small fibres to the large masses and rough stones which form the shore at Cromer on the coast of Norfolk; and is not unfrequently washed up by the tide on the sandy beach at Yarmouth, and other places to the southward. We have met with it also at Ilfracombe.

31. FUCUS CILIATUS.

F. fronde sub-membranaceâ ramosâ, ramis lanceolatis acutis ciliatis, ciliis simplicibus brevibus. *Herb. Buddle, p. 26. n. 4.*

R. Syn.

R. Syn. p. 47. n. 33. *Petiver*, p. 19. f. 2, 3.

F. ciliatus. *Gmelin*, p. 176. t. 21. f. 1.

F. ligulatus. *Gmelin*, p. 178. t. 21. f. 3.

F. holosetaceus. *Gmelin*, p. 177. t. 21. f. 2.

F. ciliatus. *Fl. Ang.* p. 580. *Fl. Scot.* p. 944. *Withering*, vol. 3.
p. 246.

Var. β—ramis sublinearibus. *Buddle*, p. 26. n. 1. *Fl. Scot.*
p. 946.

Habitant— α in rupibus marinis passim— β rarius.

Radix callus minutus, furculos emittens, unde fibrosa videtur. *Frons* sub-membranacea, rubescens, palmaris, vel semipedalis, statim latefcens et in ramos inter se similes variè dispositos divisa—*Rami* lanceolati, plerumque dichotomi, apicibus acutis—Totius frondis margines ciliati, ciliis simplicibus brevibus patentibus—*Frons* matura incrassatur et sub-cartilaginea fit; dein utraque pagina ciliis numerosis scabra, quorum plurima tuberculis globosis feminiferis terminata; tubercula etiam in ciliis marginalibus, sed rarius, occurrunt.

This species includes three of Gmelin: his *ciliatus*, *ligulatus*, and *holosetaceus*. The frond is at first membranaceous, divided almost immediately from the root, the branches $\frac{1}{2}$ or $\frac{3}{4}$ of an inch broad, the margins fringed with numerous patent *cilia*. This is Gmelin's *ciliatus*, t. 21. f. 1. but this figure is not nearly so good as the others.

In some specimens many *ligulae* are interspersed among the *cilia*, which are nothing more than young branches. This is the *ligulatus* of Gmelin, f. 3, which certainly is by no means to be considered as distinct.

When the plant is arrived at maturity it acquires a thicker sub-

stance, and becomes almost cartilaginous; and in this state each surface of the frond is frequently rough, with numerous round spines from half a line to a line in length, of which some are bifid. Some of these bear globular tubercles filled with seeds, and are certainly no other than the peduncles of these tubercles, though many of them are abortive. This is Gmelin's *holosetaceus*, t. 2, though he does not appear to have seen the tubercles.

The marginal *cilia* are always simple; such as appear otherwise being in fact *ligulæ*, about to form young branches; these sometimes, but rarely, bear tubercles.

It adheres firmly to the rocks by its fibrous base, and when taken out of the water is generally of a pale flesh colour, but, on being exposed to the air, soon acquires a full red; but sometimes it is found of a bright red colour whilst in a growing state.

The var. β which is described by Mr. Lightfoot, differs in being much narrower with almost linear branches. It is also more branched, and the branches are sometimes destitute of *cilia* on their margins. We have found it along with α , but much more rarely.

32. FUCUS JUBATUS. TAB. 17. FIG. 2.

F. fronde membranaceâ ramosâ; ramis lanceolatis acutis, ciliatis, ciliis ramosis.

Habitat in rupibus et faxis submarinis apud Ilfracombe in agro Damnoniensi, copiosè—In Insulâ Portlandiæ rarius.

Adhæret rupibus callo minuto—*Frons* a primo ortu furculosa fit—quacunque furculi faxa attingunt radicem agunt, et inde novæ fiunt plantæ, atque hæ confertæ—Porrò valde ramosa fit—*Rami* alterni plani lanceolati—E marginibus ramorum cilia emittuntur numerosissima, ramosissima, linearia, sæpè sub-capillaria—*Substantia* membranacea—*Color* ruber—*Fructificationem* nondum vidimus, at
haud

haud dubium est quin eadem sit ac *F. ciliati*—Anne ab illo satis distinctus?

Whoever will be at the trouble of comparing specimens of this *Fucus* with those of *ciliatus* will find a very striking similarity: however, we distinguish this by its *cilia* being very ramose—in *ciliatus* they are simple and undivided. The *cilia* are often round—the root, the substance, the colour and habit are nearly alike in both.

We have not found this common. We gathered a single specimen at Weymouth, where the *ciliatus* is very common. But at Ilfracombe in Devonshire, where this species is very frequent, we did not find one specimen of *ciliatus*.

We have not seen it in fructification; most probably it is similar in this respect to *F. ciliatus*; and it certainly is to be doubted whether it be absolutely distinct from that species.

The figure *Fl. Dan.* 1066, which is most unaccountably referred to *F. pumilus Fl. Ang.* appears to be a representation of this plant; but it is not sufficiently exact to allow us to quote it as such with certainty.

Where there is so much uncertainty concerning a subject, we wish to throw out every hint which occurs. Perhaps the ramosity of the *cilia* in this plant is in consequence of its not being exhausted as to its strength by the production of fructification, and thus the efforts of the plant are diverted in this channel.

33. FUCUS PALMATUS.

F. fronde membranaceâ variè divisâ palmatâ. *Buddle, p. 23.*
& *p. 25.* & *p. 27. n. 3.* *Petiver, p. 19. n. 4.* *Uvedale, vol. 1.*
p. 2. n. 4. *Morison, Hist. Ox. 646. f. 15. t. 8. f. 1.*

Fucus dulcis. *Gmelin*, p. 189. t. 26.

Fl. Ang. 579. *Fl. Scot.* 933. p. 27. *Withering*, vol. 3. p. 245.

Habitat in rupibus & faxis submarinis passim.

Radix callus parvus expansus—*Frons* submembranacea, aliquando coriacea, plerumque tenuis membranacea—*Stipes* brevis admodum, haud mora in ramos variè divisos abit: modo frons primaria brevis, indivisa, obtusa & cuneiformis est, modo dichotoma, modo elongata ramis lateralibus indivisis dichotomisque: at denique rami palmatim quodammodo dividuntur. Sæpe frons verè palmata est, etiam sub ipso ortu—*Fructificatio* etiam variis ludit imaginibus—Modo non *Fucum* sed *Ulvam* diceret, quippe granulis solitariis numerosissimis conspergi videtur. In plantis coriaceis fructificationem Fuci licet detegere, tubercula scilicet in fronde innata, apice dehiscentia—Hæc perrarò accidunt—*Magnitudo* biuncialis, pedalis & ultra—*Color* ruber.

Were not this plant extremely common, and not liable to be confounded with any other, we should think it our duty to draw up an elaborate description of it in all its various forms. Scarcely a plant in nature varies more: as the extremity of the branches usually terminates in something of a palmated form, the essential character is taken from that circumstance. But it must be observed, that it often is very backward in appearing without disguise: oftentimes the branches are lengthened out without any division; sometimes they are merely dichotomous. Sometimes the frond is proliferous, so as to lay claim to a place in our first division, *foliis distinctis*.

The description in the *Fl. Scotica* perfectly coincides with our own observations. At Weymouth and elsewhere we have found it of a perfectly coriaceous substance, as well as the thinnest membrane.

brane. We observed only in these dwarf coriaceous specimens the true fructification, which is tubercles immersed in the frond, and projecting from it, and opening at the point. In one of our smallest specimens, a largish tubercle appears standing on the surface of the disk, and not immersed: but these tubercles are rarely to be observed. In general the plant shoots out to some length; in this state it has only small seeds like granules (the character of an *Ulva*) dispersed over the whole frond, so that one would conclude it to be an *Ulva*.

May it not happen, that having fulfilled the purpose of its production, viz. the fructification, the growth of the plant accommodates itself to its just limits; but, failing in that, it runs out wild and irregular, sportive and impatient of all controul?

34. FUCUS RUBENS.

F. fronde submembranaceâ dichotomâ; ramis proliferis linearibus, ramulis apice dilatatis bifidis, laciniis acutiusculis. *Herb. Linn. Buddle, p. 26. n. 5. and p. 27. n. 5. Ginanni Op. Posth. t. 26. f. 61. Buxbaum, cent. 1. t. 60. f. 2.*

Fucus rubens. *Linn. Sp. Pl. 1630.*

Fucus crispus. *Fl. Ang. p. 580.*

Fucus prolifer. *Fl. Scot. p. 949. t. 30. fig. optima. Withering, vol. 3. p. 246.*

Habitat in rupibus, faxis, et plantis submarinis frequens.

Radix callus expansus—*Frons* ab ipso ortu sæpius ramosissima fit, nonnunquam simplex oritur, at in omnibus haud mora dichotoma est—*Rami* plani sub-energii lineares, subinde proliferi—*Ramuli* demum dilatati bifidique, et in lacinias f. lobos acutos desinunt. Aliquando frons videtur stipitata stipite brevi teretiusculo cartilagineo.

—*Rami*.

—Rami ramulique processibus sub lente foliaceis notabiles—*Substantia* sub-membranacea—*Color* sanguineus—*Altitudo* 3—6uncialis.

Mr. Lightfoot has given such an admirable description of this *Fucus*, that it is needless to add to it.

He mentions that it has no rib or nerve; but it is no uncommon thing to find plants in their advanced state with a manifest appearance of a nerve running up the centre of the larger or thicker branches.

Its prolific production of new branches distinguishes it at first sight from every other *Fucus*, which has the least affinity to it.

The nerve which we have spoken of as visible in the branches, is discovered by holding the plant before a very strong light. Indeed this is the best mode of examining *Fuci* in general: the fructification and *original* colour of any plant, be it to outward appearance from drying what it will, are most surely detected by this method. When a plant has been once bleached by its exposure to wind and weather, no art can restore its colour or discover it.

As we are certain that this is the *F. rubens* of Linnæus, the names of Mr. Hudson and Mr. Lightfoot are necessarily superseded.

It is a matter of curious enquiry, whether the prolific tendency of this plant be its natural growth, or whether it be its natural power of repairing any injury (to which its tender and brittle quality exposes it at all times) which it may have received. We have found entire plants bearing no prolific division at all.

What appear to be tubercles upon this plant are in reality rudiments of branches. Our specimens do not enable us to pronounce whether they produce seeds, or whether they are calculated to separate from their parent plant, and thus taking root, to carry on the progeny.

35. FUCUS PINNATIFIDUS.

F. fronde cartilagineâ ramosâ; ramis patentibus sub-duplicato-pinnatifidis, ramulis obtusis callofis. *Herb. Buddle, p. 18. n. 7, 8. Petiver, p. 25. n. 1, 2. Uvedale, p. 12. n. 4. Act. Paris. 1712. p. 34. t. 4. f. 6. Mor. Hist. Oxon. iii. p. 646. f. 15. t. 8. f. 2.*

Fucus Osmunda. *Gmelin, p. 155. t. 16. f. 2.*

F. pinnatifidus. *Gmelin, p. 156. t. 16. f. 3.*

F. pinnatifidus. *Fl. Ang. p. 581. Fl. Scot. p. 953. Withering, vol. 3. p. 247.*

F. multifidus. *Fl. Ang. p. 581. Withering, vol. 3. p. 248.*

F. filicinus. *Fl. Scot. p. 954.*

Habitat in rupibus et faxis marinis frequens.

Radix callus expansus ex quo cauliculi plurimi conferti oriuntur—*Frons* cartilaginea plana avenia ramosior, ramis et ramulis distichis oppositis alternisque—*Ramuli* breves, modo truncati, sæpius apice obtuso rotundato, et præ tuberculis innatis, ut videtur, calloso. *Rami* pro habitu et loco, pinnatifidi, 2—3plicato-pinnatifidi et multifidi—*Altitudo* 1—5uncialis—*Substantia* sub-cartilaginea—*Color* variat flavescens, olivaceus, et ex olivaceo ruber—*Fruetificatio* tubercula ad ramulorum apices.

Fucus *pinnatifidus* varies very much with respect to the division of its frond. Hence botanists have imagined it to contain different species, and have been at no small pains to ascertain their respective limits. As it happens to be a very common plant, frequent have been our opportunities of observing it. After very careful and repeated examinations, we can venture to pronounce that the *pinnatifidus* and *multifidus* of Hudson and the *pinnatifidus* and *filicinus* of Lightfoot.

Lightfoot are one and the same plant. This will be readily allowed by any one who will take up a cluster of these plants when growing near the low-water mark at a spring tide. In almost every such cluster he will find all the gradations of division to which we allude. *F. Osmundæ* shews it when of free growth in a young state. Mr. Lightfoot remarks (but it proves his slight acquaintance with it), that it (his *filicinus*) never produces seeds—How should it in this immature state? Morison's figure exhibits it in full and perfect growth. This is an excellent representation; but we have found it still more luxuriant on the rocks near Ilfracombe.

There is scarcely any possibility of ascertaining the cause of luxurious growth in any of the cryptogamic plants, be they *musci*, *algæ*, or *fungi*. The plants of our very gardens vary in stature and monstrosity, though cultivated with the same means and precisely the same care. How much more then may we imagine submarine plants to give into irregularities, whose occult situation and exposure to unseen currents baffle the most acute researches! On the same rock may be found plants of a simple frond barely dentated; compound plants with a simple pinnatifid division; and others with ramifications of a multiplied nature. The colour sometimes is yellowish or buff, in its more advanced state of a dark dirty red. The terminations of the smaller branches are loaded with minute tubercles; this gives them a callous appearance. These tubercles extend themselves not unfrequently a little way down the branches, and are sometimes supported on short thick peduncles.

36. FUCUS CRISPUS.

F. fronde sub-membranaceâ dichotomâ; ramis integris; tuberculis solitariis sparsis. *Linn. Syst. Nat. p. 970.*

F. ceranoides α, β, δ . *Fl. Ang. p. 582.* α, β . *Fl. Scot. p. 913. 915.* α, β, δ . *Withering, vol. 3. p. 249.*

Var. α brunneus—membranaceus, ramis dilatatis crispo-undulatis, laciniis obtusiusculis. *Herb. Linn. Buddle, p. 10. n. 8.*

F. ceranoides. *Gmelin, t. 7. f. 1.*

Var. β virens—membranaceus, ramis dilatatis planiusculis, laciniis acutis longiusculis. *Petiver, p. 20. n. 3, 4.*

Var. γ stellatus—sub-membranaceus, ramis dilatatis apice crispo-undulatis, laciniis numerosissimis confertis breviusculis. *Herb. Linn. Buddle, p. 10. n. 5, 6.*

Var. δ æqualis—membranaceus, ramis omnibus æqualibus linearibus planis, laciniis obtusis.

Var. ϵ compressus—sub-cartilagineus, internè sub-compressus, ramis sub-linearibus planis, laciniis elongatiusculis acutis. *Buddle, p. 9. n. 2. and p. 10. n. 1, 2, 3. Petiver, p. 20. n. 5.*

F. ceranoides. *Gmelin, t. 7. f. 3.*

F. filiformis. *Fl. Ang. p. 585?*

Radix, callus expansus—Ex callo confurgunt frondes plurimæ, 2—6 unciales, omnes, præterquam in var ϵ , planæ aveniæ; in var. α, β, γ , sensim dilatatæ, dichotomæ—*Fructificatio*, tubercula disco frondis, interdum marginibus innata, ovata, sæpè rotundiuscula, rubra—*Color* variat ruber, brunneus, virens, pallidus.

Var. α plerumque brunnei coloris est—Extremitates ramorum crispo-undulatæ—laciniæ obtusiusculæ—variant autem acutiusculæ—Nullibi frequentius quam apud Ilfracombe enascitur.

Var. β plerumque viret—Extremitates ramorum subcrispo-undulatae—laciniæ longiusculæ et sæpiùs acutæ—*Habitat* passim.

Var. γ mirè in lacinias numerosissimas confertas dividitur—Videtur potiùs naturæ lus quam quæ vel varietas dici possit—Inter paulò rariores.

Var. δ ramos omnes æquales sub-lineares laciniis obtusis exhibet—Anguli dichotomiarum obtusiusculi—*Color*, ruber—*Habitat* in Insulâ Portlandicâ, sed rariùs.

Var. ε haud rarò ad altitudinem octo unciarum crescit—*Frons* cartilaginea, ad basin sæpiùs compressa quam plana, sed rami omnes demum plani aut saltem planiusculi evadunt—*Rami* valdè tenues, lineares, æquales, laciniis longis acutis—*Fruëctificatio* in omnibus hisce varietatibus eadem—*Habitat* passim.

No plant can well be supposed to vary more than this. If we view the extremities of its variation, the one will be found with a broad dilated membranaceous frond—the other with a narrow linear cartilaginous compressed one. Nevertheless the transition from the one to the other is so gradual, that it is not easy to be perceived where any difference takes place—

Usque adeò quod tangit idem est—

It comes in competition with none of the *Fuci* which are arranged in this order, except the young specimens of *F. rubens*; but the slightest attention will distinguish it from this. In the first place, this plant is never in any degree proliferous; and in the next, its fructification is smooth tubercles imbedded almost or entirely in the substance of the frond, not what Mr. Lightfoot calls warts, which when magnified appear to be the curled rudiments of young leaves. See *F. prolifer. Fl. Scot. p. 951.*

To state all the varieties of this Proteus would be an endless task: we have only endeavoured to give an outline of the principal ones, to which the rest may more readily be reduced.

There is prodigious confusion in all modern authors about this *Fucus*. Having all of them taken it for granted that it is the *Ceranoi-des* of Linnæus, they have brought together a strange mass of plants, no one agreeing with the Linnæan description, or consistent with its brethren. One could scarcely imagine that such eminent writers as Gmelin and Mr. Lightfoot would have joined *crispus*, *mammillofus*, *palmetta*, and *membranifolius*, as one and the same plant, or that Mr. Hudson should have seen a similarity in those above mentioned, adding also that variety of *vesiculosus* which we call *inflatus*.

Our first variety stands in the Linnæan herbarium marked *crispus*, and it agrees with Linnæus's description. We have traced it regularly through those varieties which we have described, and can pronounce that they all proceed from the same origin.

We call our third variety (which is also in the Linnæan herbarium along with the first) *stellatus*, after Mr. Lightfoot; but we have reason to think from the synonyms in Buddle's hort. siccus, that our last variety was meant by the description *F. ceranoides albidus ramulorum apicibus stellatis*. *R. Syn. p. 44.*

The fourth variety has all its branches of the same breadth throughout, and the points are all obtuse.

The fifth variety seems at first sight scarcely to belong to this species; but to an attentive observer sufficient proof will arise, it being no difficult matter to trace the gradations from the first variety down to this. We have little doubt but that Mr. Hudson named this variety *filiformis*; and, from its compressed form, classed it in his division *Fronde compressâ*. If this be not Mr. Hudson's *filiformis*, we must profess ourselves ignorant of it altogether,

having never met with any thing which corresponds with his description.

The constant distinction of this plant is the dichotomous frond, and the smooth vesicle-like tubercles, placed irregularly towards the summits of the frond.

37. FUCUS CANALICULATUS.

F. fronde dichotomâ lineari, apicibus obtusis tuberculosis.
Herb. Linn. Petiver, p. 31. n. 2, 3. 9. Aët. Paris. 1711. pl. II. f. 5. radicem fructificationemque exhibet. Fl. Dan. t. 214. optima. Gmelin, p. 73. t. I. A. f. 2. Morison, Hist. Oxon. 3. p. 647. f. 15. t. 8. f. 12.

F. excifus. *Linn. Sp. Pl. 1627.—Canaliculatus. Syst. Fl. Ang. p. 583. Fl. Scot. p. 917. Withering, vol. 3, p. 250.*

Habitat in rupibus et faxis submarinis.

Radix callus expansus—*Frons* sub ipso ortu ramosa—*Rami* modo nati sæpe rupibus adhærent et novæ fiunt plantæ, unde plurimæ frondes ex eodem callo oriri visæ sunt—*Frons* omnino dichotoma canaliculata evadit—*Apices* ramorum obtusi, tumidi, tuberculosi—*Altitudo* 2—5uncialis—*Color* ex flavescenti olivaceus—*Substantia* cartilaginea—*Fructificatio*, tubercula conferta apices ramorum occupantia.

Obs. Rami non reverà canaliculati, at marginibus longitudinaliter hinc contractis s. inflexis, speciem canaliculorum præ se ferunt.

The order we here establish is perfectly distinct. It agrees with the order *Fronde planâ aveniâ* in having no nerve, but differs from it in being channelled on one side, and not flat or plain. This appearance arises not from any canaliculation or groove being made in
the

the solid substance of the plant, but rather from the margins being contracted as it were, and drawn through their whole length to one side—so that it has the appearance of being channelled rather than the reality. However, as the appearance is constant, we are glad, in arranging so numerous a family, to take advantage of it, and establish a new order founded upon this circumstance.

This plant is found on all rocky shores. Where it is exposed to fresh water, the points of the branches, as well as the branches themselves, are longer and coarser, and the tubercles more numerous, and consequently appear to be more tumid. We observed this particularly in the river Severn.

38. FUCUS PATENS.

F. fronde dichotomâ lineari apicibus obtusifusculis planis; tuberculis subglobosis sparsis.

Habitat prope Marazion in littore Cornubiensi, et apud Ilfracombe in com. Devon. frequens.

Radix callus—*Frons* basi ipsâ furculosa, unde plurimi caules conferti enascuntur—*Frons* linearis, et hinc leviter canaliculata—*Rami* omnes dichotomi, dichotomiis patentibus—*Apices* ramorum plani, tuberculorum immunes, obtusifusculi—*Altitudo* variat 2—6uncialis—*Color* plerumque brunneus—*Substantia* membranacea—*Fructificatio*, tubercula subglobosa prominula per extremos ramos sparsa.

Obs. Habitus *F. crispus* var. *æqualis*, at margines ramorum longitudinaliter levius inflexi, unde canaliculati videntur rami nec plani.

Hitherto we have noticed this plant only at Ilfracombe in Devonshire, and near Marazion in Cornwall. Some care is necessary to avoid confounding it with some of the varieties of *F. crispus*. The leading
mark

mark of distinction is that appearance of being channelled, which, though but slightly impressed, yet is sufficiently visible, particularly towards the base of the frond. The branches are patent, the dichotomies forming sometimes almost right angles. We have perceived in some specimens, when dried, a very strong, rank smell.

39. *FUCUS MAMMILLOSUS.*

F. fronde dichotomâ ramis supernè dilatatis, utrinque mammilloso-tuberculiferis, apicibus acutis. *Herb. Buddle*, p. 10. n. 7. 9, 10. *Morison, Hist. Ox.* 3. p. 646. f. 15. t. 8. f. 13. bona.

F. canaliculatus var. β . *Fl. Ang.* p. 583.

————— var. γ . *Withering*, vol. 3. p. 250.

F. ceranoides var. ϵ . *Fl. Scot.* p. 917.

Var. β —fronde angustâ lineari apicibus acutiufculis.

F. ceranoides var. ζ . *Fl. Scot.* p. 916.

Habitat in rupibus et faxis submarinis frequens— β prope Hastings, sed parçè.

Radix callus expansus—*Frons* basi furculosa, unde plurimi caules conferti ex eodem callo oriuntur—Haud mora dichotoma fit; ante unamquamque dichotomiam dilatatio accidit, unde rami ramulique quodammodo cuneiformes videntur—Apices bifidi; laciniis acutis—*Frons* infernè angusta canaliculata ut in præcedentibus, supernè rami lati et sæpius plani—Per totam paginam utrinque mammillæ sub-pedunculatæ sparguntur—Hæ mammillæ modo steriles et quasi rudimenta novarum frondium, modo tuberculiferæ, omnes incurvæ—*Substantia* membranacea firma—*Color* variat rubens, brunneus—*Altitudo* 2—5uncialis.

Var. β omnia fere quæ var. α habet—At frons angusta admodum, et linearis—Mammillæ rarius proveniunt, et apices ramorum obtufiusculi.

The errors which have attended the investigation of this plant, are owing in a great measure to Linnæus himself, who inadvertently under his *ceranoides* quoted the figure of Morison above mentioned. The figure altogether militates against the description which he gives of *ceranoides*; for he describes it as having *apices vesiculosos*, which *mammillofus* never has: besides, the specimen preserved in his herbarium has no affinity to it; for that is never found with those excrescences which we mention as the characteristic of this plant.

Linnæus's quoting this figure of Morison to his *ceranoides*, led subsequent authors, who naturally trusted more to such an expressive figure than to his verbal description, to mistake the plant which he named *ceranoides*. Thus Gmelin supposed *crispus* to be *ceranoides*, and *mammillofus*, inasmuch as it was so cited by Linnæus himself, a variety of it.

Mr. Hudson observing the frond to be channelled, referred *mammillofus* to *canaliculatus*; but they differ most widely, the ends of the branches in one being exceedingly tuberculated, and the other plain. So that we cannot but wonder at such a want of accuracy.

Mr. Lightfoot again carries it back to *ceranoides* in defiance of the wide difference of the very fructification, of which he seems perfectly aware. He does not seem to have noticed the frond being channelled.

When the learned in the science so differ, we must deprecate all censure upon our vanity, if we presume to hold out a truer investigation. It cannot be *ceranoides* of Linnæus or *canaliculatus*, for the ends of the branches in both those species are full of tubercles—in this, plain. It cannot be *crispus*, because the frond is plain and the tubercles are solitary and fixed in the substance of the plant; in this the frond is always channelled, and the fructification is minute tubercles in the mammillose processes standing out on each side of the several branches.

It will always be distinguished by its dilated branches with acute points, even when not in a state of fructification. The breadth of the branches varies from a line to half an inch. The colour is sometimes of a fine bright red—most commonly of a dark red brown. The plant varies in height from two to five inches.

In our *var. β* the branches it is true are very numerous, but not more so (notwithstanding Mr. Lightfoot asserts otherwise) than in *var. α*. The whole frond is about four inches high; the branches are all nearly of an equal breadth, from $\frac{1}{2}$ a line to $\frac{1}{8}$ of an inch. The dilatation of the frond takes place in this also; but from the extreme narrowness of the branches, it is discernible only by attentive observation.

40. FUCUS LOREUS.

F. fronde dichotomâ acutâ glabrâ utrinque tuberculatâ. *Herb. Linn. Buddle, p. 20. Petiver, p. 35. n. 1. Uvedale, app. p. 87. R. Syn. p. 43. n. 11 and 15. Ger. em. p. 1568. f. 5. Aët. Gall. 1712. p. 24. pl. 1. f. 2. ubi cum floribus feminibusque depingitur. Aët. Gall. 1772. partie 2. pl. 3. f. 14. y. Fl. Dan. t. 710. Gent. Mag. 1756. p. 64.*

F. elongatus. *Linn. Sp. Pl. 1627. Syn. Mor. excluso.*

F. loreus. *Linn. Syst. Nat. Fl. Ang. p. 583. Fl. Scot. p. 920. Withering, vol. 3. p. 250.*

Var. β inæqualis—fronde planâ latiore inæquali, angulis dichotomiæ obtusioribus. Aët. Gall. 1772. partie 2. pl. 4. f. 18.

Habitat—α in Insulâ Portlandicâ, et in littore australi frequens. β inter rejectamenta maris apud Yarmouth in Norfolciâ legimus.

Adhæret fortiter rupibus callo explanato unciali—Stipes teres, uncialis, crassitie pennæ cygnanæ, dein in discum concavum pezizæformem

formem uncialem vel sesquiuncialem dilatatur—*Frons* una alterave, nonnunquam etiam plurimæ e disci stipitis dilatati centro, tres vel quatuor lineas latæ, crassæ, compressæ, coriaceæ, glabræ, modò ad ipsam originem, modò post paululum progressûs dichotomæ—*Rami* iterum iterumque dichotomi, dein frons singula ad duarum vel trium ulnarum longitudinem extensa, et in plusquam viginti segmenta acutè terminata divisa—*Fructificatio*, tubercula numerosissima per totam frondem utrinque sparsa, apice perforata, et seminibus repleta—*Color* recentis plantæ olivaceus, siccatæ niger.

Var. β—fructificationem, substantiam et colorem ut in *α* exhibit—Sed *Frons* omnino plana et latior, latitudine admodum varians—Anguli dichotomiæ, qui in *α* acuti, in hâc varietate obtusissimi et quasi rotundati sunt.

This species is so singular in its form and mode of growth, that it is impossible to confound it with any other in the genus.

At the first appearance it exactly resembles a *Peziza* standing on a short thick footstalk, and in this state has been described by *Ray, Syn. p. 43. n. 15*, and by others of the older authors by the very apt name of '*Fucus fungis affinis*.' The frond, which arises from the centre of this pezizæform rudiment, exactly resembles in substance a leather thong, is without rib or nerve, bears neither leaves nor branches strictly to be so called; but is constantly dichotomously divided at intervals of 3 or 4 inches each, until not unfrequently it attains a length of 2 or 3 yards, and sometimes much more; and the divisions, being in proportion to the length, have been found to exceed twenty or thirty. The breadth, which is originally 3 or 4 lines, does not much vary, except towards the extremity, when it becomes narrower and ends in an acute point—The angles formed by the dichotomy are acute. The whole surface of the plant is

smooth, and it is covered on both surfaces with nearly imperfect tubercles, perforated at the top, and filled with seeds—Besides these, are observable on the recent plant numerous pencils of fine hairs, which have been supposed by some authors to be the stamina, and by others the styles; but which are probably organs, by which the plant receives nourishment; the same being observable on the *F. ferratus* and some other species, in which the fructification is situated very differently from what it is on this plant.

We have quoted *elongatus* of Linn. as well as *loreus* for this species, being convinced from a careful examination of the specimens in the herbarium, that they do not differ, and that the breaking of the former, which is described in *Syst. Veget.* as characteristic of the species, is merely the effect of drying after having been fixed to the paper. It is further to be observed, that the specimen named *elongatus* is mentioned as having been found in the British seas as well as *loreus*, and that no other than the latter and its above-mentioned variety have ever been found since on the British coast.

The *F. loreus* is figured in *Act. Gall. 1772, part. 2. pl. 3. f. 14. y.* where the fructification is magnified. It is the work of Messrs. Fougereux de Bondaroy and Tillet. They have examined the marine plants very minutely, but they confound *digitatus* and *bulbosus* together, saying the stipes is both flat and round. The following remark upon the fructification occurs in their treatise:—
 ‘ J’ai dessiné une des ramifications de cette plante vue à la loupe;
 ‘ l’on y decouvre de petits suçoirs que M. de Reaumur a déjà re-
 ‘ marqués, et qui font les capsules des grains de ce fucus.’ The root is figured pl. 4. f. 18, 19. but the confusion of *F. digitatus* and *bulbosus* is rather an argument against their accuracy as well as judgment.

This species is found abundantly on the rocks on the south-
 western.

western coast, and in various other places. We have gathered it also amongst other rejectamenta on the beach at Yarmouth in Norfolk.

The *var. β* differs from *α* in having the frond quite plain and flat, very irregularly varying from half an inch to an inch and half in width. The divisions are much fewer, and the angles of the dichotomy very obtuse. The pezizæform base is similar, and the whole surface is studded with fructification similar to *α*, leaving no doubt of its being a variety of that plant. It was found with *α* on the sandy beach at Yarmouth.

41. FUCUS ACULEATUS.

F. fronde sub-cartilagineâ ramosissimâ dentatâ, dentibus marginalibus subulatis erectis. *Herb. Linn. Buddle, p. 14. Uvedale, p. 8. Mor. Hist. Oxon. 3. f. 15. t. 9. f. 4. R. Syn. p. 48. n. 38. Fl. Dan. t. 355.*

F. muscoides. *Gmelin, p. 130. t. 12.*

F. aculeatus. *Sp. Pl. p. 1630. Fl. Ang. p. 585. Fl. Scot. p. 924. Withering, vol. 3. p. 259. Stackhouse, Ner. Brit. p. 24. t. 8.*

Habitat in rupibus et faxis marinis passim.

Adhæret rupibus et faxis callo crasso vix explanato—*Frons* 1-2 pedalis, olivaceo-viridis, ad originem cartilaginea, filiformis, teres, crassitie pennæ corvinæ, in ramos omnino similes, attamen paulo tenuiores, statim dividitur. Hi *Rami* aliis ramis ramulisque membranaceis, linearibus, sub-pellucidis, vix quartam lineæ partem latis, utrinque dentatis, dentibus subulatis, mollibus, alternis, erectis, femilineam circiter longis obsiti sunt. *Fructificatio*, tubercula minutissima nigricantia in ramis ramulisque, sparsa.

In this species a part of the frond is filiform and a part compressed; whence it might be considered as doubtful under which division it ought be arranged. We have thought proper to place it here, because much the greater part of the plant is linear and compressed; and because the specimens which are found separated from their native rocks, have very rarely the lower filiform branches adhering—and therefore, if it had been arranged in the next division, difficulties might have been occasioned in ascertaining a plant not otherwise easily to be mistaken.

It partakes of the nature of the cartilagineous and membranaceous *fuci*, the lower filiform branches being entirely of the former, and the compressed branches absolutely of the latter description. The subulate erect teeth, which proceed from the margins of the smaller branches in a regularly alternate order, do not differ in substance from the branches themselves, and are like them compressed; and this circumstance prevents the possibility of confounding this species with any other in the genus.

The fructification has been hitherto unnoticed; but we have been favoured with specimens gathered by Dr. Withering on the shores of the Tagus, on which are discernible extremely minute tubercles, thinly scattered on the surface and on the margins of the linear branches, almost black, and apparently filled with seeds. Besides these, in some of the older specimens axillary nodules have been discovered, having the appearance of congested tubercles; but we dare not positively assert that they are such, and recommend it to botanists residing on the sea-shore carefully to examine the recent plants, in order to ascertain the real nature of these excrescences.

The variety mentioned by Mr. Lightfoot, p. 926, under the name of *β caudatus*, has never yet fallen under our observation; but that this is the *Muscoides Sp. Pl. p. 1630*, cannot be doubted, that species
being

being in *Syst. Veget.* given as a variety of *aculeatus*, and referred to *Gunner. Act. Hidros.* 4. p. 83. t. 7. notwithstanding this figure is so extremely bad that nothing could be conjectured from it alone. To this variety also must undoubtedly be referred *Muscoides Fl. Ang.* p. 590. Gmelin has included both under the name of *Muscoides*.

It is frequent on the northern and western coasts of Great Britain, and has been found amongst other rejectamenta on the beach at Yarmouth in Norfolk.

42. FUCUS CORNEUS.

F. fronde cartilagineâ ramosissimâ, ramis latioribus alternis, ramulis oppositis divaricato-ascendentibus obtusis.

Herb. Buddle, p. 2. n. 1.

—————, p. 38. n. 1. 2. 4. } majores.

Petiver, p. 25. n. 6.

F. spinosus. *Gmelin*, p. 161. t. 18. f. 3.

F. corneus. *Fl. Ang.* p. 585. *Withering*, vol. 3. p. 252.

Var. β filicinus—fronde tenui, ramulis horizontalibus obtusissimis.

F. filicinus. *Fl. Ang.* p. 586.

F. nereideus. *Fl. Scot.* p.

Var. γ pinnatus—fronde tenui, ramulis patentibus obtusiusculis.

F. pinnatus. *Fl. Ang.* p. 586.

Var. δ uniformis—fronde tenui, ramis ramulisque basi attenuatis patentibus obtusis.

Habitat in littoribus saxosis, in rupibus et faxis—*α, β*, prope Exmouth in Devoniâ—*γ* in Insulâ Portlandiâ—*δ* prope Ilfracombe.

Var. α. Radix callus minutus—*Frons* ad basin ipsam ramosa et quasi furculosa, furculis statim radicanibus, unde frondes plurimæ confertæ exoriuntur, et cava saxorum sæpè cingunt, ex quo radicem

repentem dicas—*Rami* primarii ramulis latiores sunt, variè ramosi—*Ramuli* distichi, sub-oppositi, modò divaricati, modò adscendentes, juniores tenues acuti sub-setacei, adultiores paulùm dilatati obtusi. Hi ramuli aliquando simplices evadunt, sæpiùs apicem versus ramulos minores gerunt, ejusdem ac priorum, pro ætate, formæ—*Color* amœnè ruber—*Substantia* cartilaginea—*Fructificatio*, tubercula in ramulorum adultiorum apicibus—*Altitudo* 1—4 uncialis.

Var. β. Omnia ut in var. α—Sed *frons* omnino tenuis et interdum fere capillaris—*Ramuli* extremi nonnunquam pro habitu frondis valde dilatati—*Ramuli* omnes horizontaliter sese porrigunt—*Frons* saturatiùs rubra.

Var. γ. *Frons* infernè sæpè simplex et nudiuscula est—*Ramuli* omnes patentés acutiusculi—In hâc var. fructificationem nondum vidimus.—*Rami* tenues admodum sub-triplicato-pinnati—*Frons* pallidè rufa.

Var. δ. Hæc var. præcedentibus paulò altior exurgit—*Rami* omnes et ramuli ferè pari latitudine, angusti s. tenues, obtusi, ramosissimi—*Ramuli* patentés basi attenuati—*Color* saturatiùs ruber—*Fructificatio* hodie ignota.

We have not proceeded in our arrangement and description of the several varieties above mentioned, without much caution and repeated examination. That in an artificial system they cannot be separated, but are really connected by links of nice gradation, will be evident to any one who will trace them out carefully. We are confirmed in this the more by observing, that all botanists* have been puzzled in allotting limits to Mr. Hudson's *corneus*, *pinnatus*, and *filicinus*. The grand character in all is, their throwing

* Gmelin remarks p. 239—*Fuci* in Flora Anglica Hudsoni dubii; F. FILICINUS ET PINNATUS.

out small branches more or less horizontal and obtuse: the variation consists in the breadth or fineness of the principal branches, and the proportion which they bear to each other. The difference of soil and situation most likely occasions this variety of appearance.

We found the two first varieties, both small in their kind, on the rocks near Exmouth in Devonshire—the var. α on the edges of the little cavities of the rocks under the coarser sorts, viz. *F. serratus*, *vesiculosus*, &c.—the var. β was a little more exposed. The third var. we have found only on the extremity of the Isle of Portland near the lighthouses—the fourth near Ilfracombe, where it is very plentiful. All these varieties are readily kept distinct from *obtusus* by their extreme branches being obtuse and entire, and not truncated.

The specimens preserved in Buddle are large, and, being blanched, so justly answer his description of *corneus et tenax*, that we preserve the name *corneus*. The propriety of this appellation is seen only in these larger and thicker specimens. Mr. Lightfoot does not appear to have seen it otherwise than in its smaller state, such as it appears in our second variety. He called it *nereideus*, from its similarity to the *Nereis*, an animal classed by Linnæus among the *Mollusca*.

It is a great argument, we own, for these varieties being separated into distinct species, that they are found growing in such distant situations, and so detached from each other; but their limits are not to be ascertained.

We have not observed any fructification upon the two last varieties.

43. FUCUS GIGARTINUS—TAB. 17. FIG. 3, 4.

F. fronde cartilagineâ dichotomâ ramosâ, ramis æqualibus acutis spinoso-dentatis; tuberculis globosis lateralibus sessilibus. *Herb. Linn. Murray Syst. Veg. p. 971.*

Habitat

Habitat in littore Cornubiensi—*D. Wenman*—Copiosissimè ad scailas adscensûs in ponte marino St. Ives. *D. Loefling* in Herbario Linnæano.

Radix callus expansus, ex quo cauliculi plurimi assurgunt, conferti. *Frons* filiformis compressa palmaris basi simplex, mox ramosa rigida. *Rami* dichotomi, ramulis acutis hinc inde dentibus validis cornuum instar armatis: hi dentes re verâ rudimenta sunt aliorum ramulorum. *Fructificationes* globosæ, dentium axillis, sive sub apice dentium affixæ—hinc fructificatio sæpiùs quasi mucrone sive setâ aut processu quodam subtendi videtur. *Color* nigro-purpureus apicibus dilutioribus, sæpe olivaceis, quod et in *F. lumbricali* necnon in cæteris accidit. *Substantia* cartilaginea.

Obs. Variat magis minusve compressa.

It is but very lately that we have been enabled to class this species among the tribes which adorn our shores. We owe this privilege to the information given us by the Hon. Dr. Wenman of All Souls College, Oxford.

It will be readily distinguished from any other in this division, by the sharp thorny appearance of the plant, and by its sessile globose smooth tubercles, not to mention its rigid texture.

Murray, who was the first who gave a description of this plant, mentions the tubercle as sustained by a short footstalk, which subtends and is longer than the tubercle. No dependance can be placed upon this remark. The fructification is always sessile at the base or axilla of a little branch. In its perfect form this little branch projects beyond the tubercle; but it is rarely found with any regularity in this state; for, in consequence of the agitation of the sea, the branch is often broken off; whence the tubercle appears in its true situation, always sessile, sometimes single on a
main

main branch, sometimes double or treble on a little one, and not unfrequently terminal.

The frond appears sometimes to have roundish branches, so as scarcely to justify our placing it in this division—but they are generally compressed, the upper ones always so in a greater or less degree.

44. FUCUS CORONOPIFOLIUS.

F. fronde cartilagineâ ramosissimâ, ramulis obtusis multifidis sub-confertis; tuberculis globosis pedunculatis, sessilibusque.

Herb. Buddle, p. 12. n. 1.—Petiver, p. 25. n. 3.

Fucus coronopi facie. *R. Syn. p. 45. n. 23.*

Habitat in rupibus submarinis Dorsetiæ, Devonix et Cornubiæ.

Adhæret rupibus callo paullulum explanato—*Frons* 4—6 uncialis, cartilaginea, compressa, sub-diaphana, statim in ramos plurimos divisa—*Rami* sæpiùs alterni, nonnunquam dichotomi, apicem versus tenuiores—*Ramuli* numerosissimi, plerumque conferti, lineares apicibus obtusis—anguli ramificationum totius plantæ semper obtusi sunt—*Fructificatio*, tubercula minutissima, modò sessilia, modò pedunculata, in ramulis extremis sita, atro-purpurea—*Color* ex rubro purpurascens.

That the plant now described is the *Fucus coronopi facie* of R. Syn. has been ascertained from the examination of Buddle's *Hortus Siccus*, where the original specimen gathered by Mr. Stevens on the coast of Cornwall is preserved. We have also received specimens from the same coast, corresponding exactly with that above mentioned.

The *Fucus cartilagineus* of Hudson should, from his reference to *Ray's Synopsis*, be this plant; but as his specific character is taken

from the *Syst. Nat.* and as this as well as the other references (except those of Ray and Buddle) certainly belong to *cartilagineus* Linn. or Cape Fucus, it is impossible to quote the *Flora Anglica* with any degree of certainty.

The whole plant is strongly cartilagineous; the principal branches are thickest in the middle, and attenuated towards the sides, giving them somewhat of a two-edged form, and in the dried specimens somewhat of the appearance of a nerve; but this vanishes on being held to a strong light. The terminating *ramuli* grow without order, are linear, end obtusely, and are generally crowded. The angles of the ramification throughout the whole plant are very obtuse. These particulars sufficiently distinguish it from any of its congeners with which it might be supposed to have any affinity. The fructification consists of globular tubercles, very minute, and apparently supported on peduncles, longer, equal to, or shorter than the tubercles. When filled with ripe seeds, these are nearly black. The rest of the plant is reddish purple, the terminating branches paler than the rest.

Perhaps the tubercles ought, strictly speaking, to be described sessile on the sides, or in the axillæ of the small branches at the extremity of the frond. But these small branches are almost always broken off by the agitation of the sea. Hence the tubercle is necessarily oftentimes terminal, and of course to all appearance pedunculated. We have seen many specimens, when on the point of producing their tubercles, with their extreme branches perfect, and in this case the tubercles sessile, as before observed. *F. gigartinus* appears to be affected by the like accidents.

45. FUCUS COCCINEUS.

F. fronde sub-cartilagineâ ramosissimâ, ramulis subulatis secundis; tuberculis globosis subsessilibus. *Herb. Buddle, p. 29. n. 1. 4. Petiver, p. 26. n. 1.*

F. plocamium. *Gmelin, p. 153. t. 26. f. 1. R. Syn. p. 37. n. 1.*

F. coccineus. *Fl. Ang. p. 587. Fl. Scot. p. 955. Withering, vol. 3. p. 253.*

F. cartilagineus. *Fl. Ang. ed. 1. p. 473.*

Habitat in rupibus faxis plantisve marinis ubique.

Radix fibrosa furculos emittens unde novæ fiunt plantæ—*Frons* solitaria vel numerosa conferta, dodrantalis aut semipedalis, vix cartilaginea, filiformi-compressa, crassitie fili emporetici minoris, coccinea, diaphana, supra-decomposita—*Rami* ramulique nonnunquam alterni, plerumque autem alternatim secundi sunt, i. e. duo vel tres ramuli ex uno ramorum latere, dein duo vel tres ex altero latere alterno ordine prodeunt—*Ramuli* extremi brevissimi, subulati, constanter secundi—*Fruëtificatio*, tubercula minima, ex rubro-nigrescentia, in ramulis sessilia, et nonnunquam, sed rarissimè, pedunculata.

This very beautiful species is distinguished from all its affinities by the disposition of its branches, particularly the extreme ones, and by its much brighter colour. The secondary branches sometimes grow alternate, but much more frequently from one side of the primary branches, and this in a regularly alternate order, as has been already described, and in which singular disposition of its ramification, this plant differs from all its congeners.—The remaining divisions of the branches, except the last, constantly follow the same disposition: but the extreme *ramuli* are always clothed with minute subulate teeth, growing from one side only, and somewhat resem-

bling a comb in form. These teeth, when the plant is dried and displayed, give it something of a reticulated appearance, and probably induced Gmelin to adopt the not very apposite name of *plocamium*.

The fructification consists of minute tubercles scarcely so large as mustard seed, for the most part sessile, it being very rare to meet with one supported on a peduncle, affixed to the sides of the smaller branches in considerable quantity, but always single, and when filled with ripe seeds nearly black. We have observed, on some specimens, tubercles somewhat larger, of the same colour as the frond, and always empty. Whether the plant be dioecious, and this the male fructification, must be left to future enquiry.

When old, or exposed on the beach, the colour is frequently pale yellow or white intermixed with the red; but when young and vigorous, it is never seen of any other colour than bright red approaching to scarlet, and the most brilliant of any of the genus: when dried, this changes to a purplish red.

It is found on every part of the British coast, and is very often parasitical on other plants, particularly the larger Fuci.—We have observed it on *vesiculosus* and *fibrosus*, and also on *crispus*.—When in this situation it frequently forms thick tufts not exceeding an inch in height, and might easily be mistaken for a different plant.

46. FUCUS PLUMOSUS.

F. fronde subcartilagineâ ramosissimâ, ramis supra-decomposito-pinnatis, ramulis oppositis; tuberculis globosis pedunculatis.

Herb. Linn. Buddle, p. 29. n. 7. Fl. Dan. t. 350. R. Syn. p. 38. n. 2. t. 2. f. 5. Linn. Syst. Nat. Fl. Ang. p. 587. Fl. Scot. p. 955. Withering, vol. 3. p. 254.

Habitat in littoribus Britannicis passim.

Radix.

Radix callus crassus—*Frons* purpurea, sub-cartilaginea, ramosissima; variat longitudine 2—6 uncialis et ultra—*Rami* primarii filiformi-compressi, opaci, inordinatim positi, in alios ramos ramulosque compressos, sub-diaphanos, supra-decompositos dividuntur—*Ramuli* terminales oppositi, patentés, modò subulati dentati, nonnunquam simplices, sæpiùs spinis mollibus subulatis pinnati sunt—*Fructificatio*, tubercula globosa, pedunculata, atro-purpurea, in ramulis supremis sita, matura quadrifariam dehiscentia.

If this species cannot rival *coccineus* in brilliancy of colour, it is far superior in the elegant form of its ramifications, giving it the appearance of a beautifully branched feather, which sufficiently distinguishes it from all in the same division.

It varies somewhat in different situations, and, when the extreme *ramuli* are more distant than usual, somewhat resembles some of the varieties of *corneus*. It may nevertheless always be distinguished by the form of the main branch and its sub-divisions, which are always between filiform and compressed, of a darker colour than the rest of the frond, and opaque; whilst in the narrow varieties of *corneus*, they are flat, alike in colour, and have always some degree of transparency.

This plant varies extremely in size. On the southern coast it rarely exceeds three inches in height, and is frequently much smaller, as represented by Dillenius in *R. Syn.*—In Scotland it rises often to six inches or more, as has been observed by Mr. Lightfoot; and we have specimens now before us gathered at Scarborough, which are full six inches in height.

The ingenious author of the *Flora Scotica* has well described the fructification, except that the tubercles before bursting appear to us to be rather globular than oval.

A considerable variation of appearance is observable in the extreme ramifications, which are opposite, usually naked at the base, and pinnated at the summit; but are sometimes alternately short and long, the shorter being subulate, and either entire or finely toothed, and the opposite one pinnated, with subulate processes.

The figure in *Fl. Dan.* represents the larger specimens of this plant, but without the delicacy observable in the original. *F. plumosus* of Gmelin is most probably our plant; but some little doubt cannot but arise from the *ramuli* being described as sub-articulate; which seems rather to point it out to be *Conserva plumosa*, as we have never observed the smallest appearance of articulations in the plant now described.

47. FUCUS NODOSUS.

F. fronde subdichotomâ, foliis distichis obovatis, integerrimis; vesiculis innatis solitariis fronde latioribus. *Herb. Linn. Buddle, p. 13. opt. Petiver, p. 35. Uvedale, p. 3*.*
Gmelin, t. 1. B. f. 1. Fl. Dan. 146. Hist. Ox. f. 15. t. 8. f. 2. Reaumur, Aël. Gall. 1712, p. 26. t. 2. f. 3. Linn. Sp. Pl. 1628. Fl. Angl. 584. Fl. Scot. 918. Withering, v. 3. p. 251. Ray. Syn. p. 48. n. 41.

Habitat in littoribus Britannicis ubique.

Radix callus expansus crassissimus. *Fronde* plurimæ e radice oriuntur, lineares compressæ crassæ. *Divisura* ramorum varia, plerumque autem dichotoma. *Folia* disticha, gemina vel plura obovata integerrima, in petiolum attenuata, unde aliquantulum spatulata, tandem mucosa intumescunt & tuberculis numerosis repleta sunt. *Vesiculæ* ellipticæ, ovatæ, solitariæ, distantes, caule ramisque innatæ, & his bis terve latiores. *Color* recentis plantæ olivaceus, siccatae niger.

ger. *Substantia* cartilaginea omnino coriacea et tenax. *Altitudo* variat—ad duas ulnas.

This *Fucus* is so common and so well known, that any long description of it must be unnecessary: the large elliptical vessels or air-bladders, which form its most conspicuous character, and from which its trivial name is taken, sufficiently distinguish it from all other British species. These vesicles are solitary, distant from each other, much wider than the stalk, and decrease regularly in size from the lowest to the uppermost on each frond or branch. The lower part of the frond is usually destitute of vesicles as well as leaves; but there is always a small vesicle above the uppermost leaves, from which the branch continues again naked to the summit, which is obtuse. The distichous leaves in an advanced state are swelled, replete with mucus, and contain numerous tubercles, each having a corresponding opening on the surface of the leaf.

It is common on every part of the British coast, on the rocks, and also on the piles and other wood-work of the harbours, and is often adorned with large tufts of *Conferva polymorpha*, which appears particularly to attach itself to this species of *Fucus*.

The vesicles vary in size from the bigness of a pea to that of a crow's egg, and even larger.

48. FUCUS OBTUSUS.

F. fronde cartilagineâ ramosissimâ, ramis ramulisque sub-oppo-
sitis erectiusculis obtusissimis truncatis.

Fl. Ang. p. 586. Withering, vol. 3. p. 253.

Habitat in rupibus et faxis marinis haud infrequens—In *Insula* *Portlandiæ*—prope *Weymouth*—*Exmouth*.

Radix callus minimus furculos protrudens unde novæ fiunt plantæ—*Frons* solitaria vel numerosa, compressa, purpurascens, 3—4uncialis, crassitie fili emporetici minoris, ramosissima—*Rami* sæpius oppositi, rarò sparsi, basi attenuati—*Ramuli* sessiles, sed brevissimi, erectiusculi, apicibus incrassatis obtusissimis truncatis—*Fruëctificatio*, tubercula minuta in ramulorum apicibus, necnon ad ramorum latera sita, atro-purpurea.

This species, which appears to have been first described by the author of the *Flora Anglica*, cannot be confounded with any in this division, unless the varieties β and γ of *corneus*, from both which it is easily to be distinguished by being, though cartilagineous, of a more tender substance; by having the branches attenuated at the base; and, notwithstanding they are compressed, not so completely flattened; by the somewhat erect growth of the *ramuli*; and more particularly by having the branches truncated at the end, and by the fructification: this consists of minute nearly black tubercles, situated in the dilated terminations of the *ramuli*, as described by Mr. Hudson; and also, as we have observed not unfrequently on our specimens, on the sides of the larger as well as the smaller branches. The primary frond is continued throughout, the branches are short near the base, longer in the middle, and very short towards the summit, giving the whole an ovate form.—The principal branches are clothed with secondary ones growing in the same manner, and these with the extreme *ramuli*; nor have we observed it farther divided.

49. FUCUS LICHENOIDES.

F. fronde dichotomâ ramosâ, ramis apice dilatatis; tuberculis globosis terminalibus.

Lichen faxatilis, maritimus, muscosus, minimus, nigerrimus.

Michel. Nov. Gen. p. 103.

F. pygmæus. Fl. Scot. p. 964. t. 32. Withering, vol. 3. p. 232.

F. pumilus. Fl. Ang. p. 584.

Habitat in rupibus et faxis marinis inter fluxum et refluxum maris frequens—in Insulâ Portlandiæ—prope Ilfracombe—in Insulâ Juræ.

Ex callo minuto expanso latefcenti cauliculi plurimi oriuntur—*Frons* a primo ortu ramosa fit, ramis radicanibus, unde repentem dicas—Ad ipsam basin cauliculi teretes sunt, at statim compressi, et in cartilagineam dichotomam dilatati—Apices ramorum obtusi, subtruncati—*Fructificatio*, tubercula sæpiùs glabra vesiculas referentia, apice pertusa, ipsis summitatibus ramulorum adhærentia—*Color* variat olivaceus, viridi-olivaceus, niger, ater—*Substantia* cartilaginea—*Altitudo* $\frac{1}{4}$ —*Uncialis*.

Wherever this little Fucus is found, it covers whole masses of stones in the manner of Lichens. From its great likeness to this genus, we have changed the uninteresting names of Mr. Lightfoot and Mr. Hudson to *Lichenoides*. This very appellation will lead to its distinction.

Mr. Lightfoot was so struck with this similarity, that his whole description dwells upon it.—His figure is excellent.

The fructification of this little species is somewhat singular. Generally speaking, it is a round and perfectly smooth tubercle, resembling a minute bladder, opening more or less at the top; but we see occasionally minute granulations on the surface of it.

50. FUCUS FILUM.

F. fronde filiformi simplice sub-fragili. Herb. Lin.—Buddle,
VOL III. C c p. 24.

p. 24. *n.* 2.—*Petiver*, *p.* 35.* *n.* 2. *Uvedale*, *p.* 6. *n.* 4. *R. Syn.*
p. 43. *n.* 3. *Fl. Dan.* t. 821. *Linn. Sp. Pl.* *p.* 1631. *Fl. Ang.*
p. 587. *Fl. Scot.* *p.* 963. *Withering*, vol. 3. *p.* 254.

Habitat in rupibus et saxis marinis apud Cromer in Norfolciâ & alibi frequens.

Radix callo minimo expanso—*Frons* simplicissima, sæpiùs conferta, aliquando solitaria, filiformis, teres, glabra, crassitie pennæ corvinæ, ad duarum vel trium ulnarum longitudinem sæpè extenditur; basi apiceque attenuato, cetera uniformis—*Substantia* membranacea et subfragilis, fistulosa, constanter cava absque medullâ—*Annuli* plurimi per totam cavitatem irregulariter positi, confervarum septa æmulantes, visi sunt—*Color* recentis plantæ olivaceo-viridis, siccatæ niger—*Fructificatio* incognita.

This species differs from all other *Fuci* in habit, and has been supposed by some authors to belong more properly to the genus *Conser-va*, from having the appearance of transverse septa or diaphragms through the whole length of the frond. On holding the plant to the light, it will however be observed that these apparent septa are placed at unequal distances, are frequently oblique, and that there are no corresponding contractions visible on the exterior surface; in all which particulars it differs from the *Conservæ*. If the recent plant be dissected longitudinally, and examined with a glass, it will be found, that instead of septa these are merely rings formed on the internal substance of the tube, and that no diaphragms whatever can have been connected with them, as they are uniform, and covered with a slight woolliness exactly in the same manner as the rest of that surface. They do not appear to contain the fructification, and may perhaps be intended only to strengthen the plant, and to enable it the better to maintain its round and tubular form.

We have never observed any kind of fructification in this species, and it is very doubtful whether it be really a *Fucus*; if not, it certainly has more affinity with some plants at present placed in the genus *Ulva*, than with any of the *Confervæ*. It very much resembles the *Ulva fistulosa* of the *Flora Anglica*, particularly in a young state, but differs in its much more extended growth, by being less tender and fragile, and, most of all, from the internal annuli, which are never observable in the latter plant.

It may be proper to observe, that the reference in *Sp. Pl.* to *Am. Acad. p. 259. t. 3. f. 2.* is erroneous; what is there described being *Fucus Tendo*, a production now well known to belong to the animal and not to the vegetable kingdom.—This species is sometimes met with extremely-twisted.

51. FUCUS TOMENTOSUS.

F. fronde filiformi ramosissimâ tomentosâ; ramis dichotomis apicibus angulisque obtusis. *Herb. Buddle, p. 34. n. 5. opt.*
Petiver, p. 42. n. 5. opt. *Morison, Hist. Ox. 3. f. 15. t. 8. f. 7.*
Petiver, Gaz. t. 4. f. 12.

Spongia dichotomos teretifolia viridis. *R. Syn. p. 29. n. 3.*
 ————— compressa ex viridi-splendens. *R. Syn.*
p. 29. n. 4.

F. tomentosus. *Fl. Ang. p. 584.*

F. elongatus. *Withering, vol. 3. p. 251.* *Stackhouse, Ner. Britt.*
p. 21. t. 7.

Habitat in Insulâ Portlandiæ, sed rariùs—prope Exmouth—prope Plymouth, et per totum littus Cornubiense australe; frequens nullibi.

Radix nulla nisi basis frondis paululum explanata—*Frons* 4—6 uncialis, filiformis, vix ac ne vix compressa, crassitie pennæ anseri-

næ, ramosissima—*Rami* dichotomi, apicibus necnon angulis ramificationum obtusis—*Substantia* membranacea, fistulosa, extùs tomentosa feu potiùs velutina, splendens—*Color* viridis—*Fructificatio* incognita.

The frond in this species is slightly compressed; but as it approaches much nearer to a round than to a flattened form, it seems to belong more properly to this division than to the preceding.

The whole plant is membranaceous and hollow, covered with a glossy velvet down, which sufficiently distinguishes it from all with which it might be supposed to have any affinity. From these circumstances, and from there never having been yet any fructification discovered, it is very doubtful whether it may not belong to the genus *Ulva*; but till this can be ascertained, we have thought it most proper to continue it in the situation where it has been hitherto arranged.

The root is merely an expansion of the frond, by which it adheres to the rocks.—It is of a grass green colour, much branched, the branches dichotomously divided with obtuse angles; the terminating forks 2, 3 or 4, varying in length from a line to half an inch, more or less blunt, with the angles very much rounded. The plant retains water like a sponge, and is as easily pressed dry; a circumstance noted in Ray's *Synopsis*.

This species is erroneously referred in the *Flora Anglica*, and in Withering's *Bot. Arrang.* to *elongatus* Linn. which we believe not at all to differ from *loreus*, and to which it has not the smallest affinity. That it is the plant figured in Morison, the *Spongia dichotomos teretifolia viridis* of R. Syn. cannot be doubted; nor do we hesitate to refer to this the *Spongia dichotomos compressa ex viridi-splendens* of Dillenius R. Syn. found by Mr. Stevens on the coast of Cornwall, having in our possession

possession specimens agreeing exactly with the description, and with the figure of Petiver there quoted.

We have never had an opportunity of examining this species in a recent state, but have been favoured by Mr. Stackhouse with a drawing accompanied with an account of the plant; from which, and from dried specimens, we have been enabled to draw up the foregoing description.

The dried specimens, preserved in Petiver's and Buddle's *Hortus siccus* in the British Museum, are exceedingly good ones.

52. FUCUS DIFFUSUS.

F. fronde filiformi dichotomâ articulâtâ; ramis divaricatis diffusis apice acutis. *Fl. Angl. p. 589.*

Habitat in rupibus & faxis submarinis—apud Weymouth, Hastings, & alibi.

Radix callus parvus expansus—*Frons* filiformis, dichotoma, ramosa, sæpiùs ramosissima, fili emporetici minoris crassitie, ramis divaricatis, diffusis, articulatis, articulis brevissimis, apice acutis—*Magnitudo* biuncialis, dodrantalis—*Substantia* cartilaginea—*Color* rubens—*Fruëtificatio* nondum a nobis visa est.

We have felt some little difficulty in arranging this species among the *Fuci*. Its habit and jointed form, and want of fructification as far as we have been able to observe, indicate so close an affinity to the genus *Conferva*, that we were almost tempted to omit it. However, as we have reason to believe that this is the plant designed by Mr. Hudson, under this name, we looked upon the *onus probandi* as laid upon us, if we ventured to alter his arrangement. The substance is of a firmer texture than *Confervæ* usually are ;

are; and perhaps that circumstance influenced his judgment. At the time in which he wrote, that appearance had greater force than perhaps it deserved.

We have never yet seen it in fructification: could that be found, we should have sure grounds for our determination.

This is by no means an uncommon plant. It may be found on most rocky shores. Its beautiful red colour, and its extremely diffuse and divaricated habit, render the investigation of it perfectly easy. Under a glass, and even to the naked eye sometimes, the branches appear jointed with very short joints.—They are always sharp-pointed. In a recent state it is of a fine lively red: in drying, it becomes quite of a dark or black red colour.

53. FUCUS TUBERCULATUS.

F. fronde filiformi dichotomâ; ramis inæqualibus obtusis apice tuberculatis, angulis ramificationum obtusis. R. Syn. p. 43. n. 13. Fl. Ang. p. 588.

F. bifurcatus. Withering, vol. 3. p. 257. t. 17. f. 1.

Habitat in rupibus marinis in Insulâ Portlandiæ—Ilfracombe in agro Devon.—St. Ives in agro Cornub.

Adhæret fortiter rupibus callo explanato—*Frons* teres filiformis, crassitie pennæ corvinæ 2—11uncialis & ultra, erecta, glabra, olivacea—cito fit dichotoma, angulis obtusis, ramis ramulisque inæqualibus—Dichotomiæ variant pro magnitudine plantæ 1-2-3 pluri-mæ—*Fructificatio*, femina obtusa in apicibus ramulorum tuberculorum inclusa.

This species is sufficiently distinct from all its affinities: from *lumbricalis*, *fastigiatus* and *radiatus*, by having its branches of unequal lengths,

lengths, and not fastigiated or level; from *diffusus*, by having its branches all blunted at the end, and swelled by the fructification included in them; and from *plicatus*, by its upright, simple and unentangled growth.

The plants found at the Isle of Portland are usually of humble growth, and are well represented by Dr. Withering's figure: but at Ilfracombe in the north of Devonshire they are of a much taller figure, and the divisions of the frond are very numerous.

The fructifications are always at the ends of the branches, and imbedded in the substance of them. The plant in a recent state is always of a pale olive colour, but when dried it turns nearly or quite black.

It adheres to the firmest rocks very strongly by means of a thick leathery substance, from which several stalks sometimes arise in a sort of cluster. We have never observed it growing upon moveable stones, but only on the fixed firm rock.

54. FUCUS FASTIGIATUS.

F. fronde filiformi dichotomâ ramosissimâ; ramis fastigiatis obtusis, angulis ramificationum sub-rectis. *Herb. Linn. Petiver, p. 31. n. 4. Morison, Hist. Ox. 3. p. 649. f. 15. t. 9. f. 9. Fl. Dan. 393. optima.*

Var. β Interceptus. Dichotomiis ultimis omnibus geniculato-annulatis.

Habitat in rupibus et saxis marinis passim—*β* apud Cromer in Norfolkîâ.

Radix callus expansus—sed frons ad basin valde furculosa—Surculi ubi saxa attingunt disco novo explanato, qui radix alterius fit, sæpiùs adhærent, unde cauliculi plurimi conferti assurgunt—Hi cauliculi

culi modò erecti modò procumbentes, diffusiufculi, teretes, ramossissimi, dichotomi, ad apicem sæpè trifidi, apicibus obtusis—Anguli ramificationum magis patentés quam in affinibus, immò sub-recti—*Rami* fastigiati, et sæpissimè ad ultimas dichotomias annulati et quasi geniculati—Est ubi vix ac ne vix unum geniculum adest—Interdum ut in β omnis extrema dichotomia annulo ornatur—*Substantia* cartilaginea—*Color* nigro-olivaceus, in apicibus ramorum sæpè virefescens, pallidus—*Fruëtificatio*, tubercula lateralia in ramis ramulisque sparsa—*Altitudo* in α 1—3uncialis et ultra; in β 3—7uncialis.

The different appearances which this plant assumes have created no small trouble in endeavouring to strike out a proper specific character. This difficulty has arisen in no small degree from that appearance of rings which is observable in some, but more especially in the larger specimens. They have perplexed many.

We have dissected many of these rings in various directions, and have never been able to discover any tendency to fructification in them. We observe also, in general, that these rings very seldom occur in the smaller plants. We mention these two circumstances as grounds of argument, that the rings ought to have nothing to do in constituting the species; for we argue that they are owing to an injury having been received, and in consequence, the progress of growth being carried on by a new branch shooting out from the internal part, a sort of callous scar, or annular seam, remains as a memorial of the truncation of the part. Thus, as this is no organ of fructification, we say it is not a necessary part; and as it is not constant in the smaller specimens (by smaller we do not mean younger, for the smaller specimens we speak of are so from soil and situation) we argue it is no character. We are therefore fairly at liberty to use our own ideas, and suppose these rings merely as the effect of injury.

Our

Our first variety entirely accords with the specimens in the Linnæan Herbarium. We found it in great plenty on the rocks at Ilfracombe. It there seldom exceeded three inches in height: it grew erect and compact, the branches of the thickness of small wire, and scarcely a ring upon them. Very few of the branches (probably owing to their humble growth and firm texture) had ever suffered any injury. At Hastings we have found it from three to nearly five inches in height. The plants were all somewhat diffuse and procumbent. The injuries done them (being very much exposed to the force of the waves) were frequent, and the rings (for rings are almost constantly attendant upon the injuries, at least where the injury has not stopped the farther growth of the plant) were observable in proportion. As these plants grew taller, so also their branches are somewhat thicker than at Ilfracombe.

At Cromer in Norfolk we have met with our variety β *interceptus* in abundance. We so call it from all the branches having almost constantly these annular callosities just at their last division. It here grows to the height of six or eight inches, and the branches are all proportionably thicker. In this variety the branches produced after the annular process are more pellucid (owing perhaps to the thinness of the new tender substance) than usually is seen in the former: but nothing is more common than to see, in all stages of growth, the tips of the branches greenish and of a clearish cast.

Two things are too striking not to be mentioned: first, that these rings are never to be seen but at the extremities of the frond, and when the length of the branches makes them more capable of being broken off; and farther, that no one branch has scarcely ever more than one ring. All subjects in nature are endued with a power of repairing ordinary injuries; but reparation is the consequence of

extraordinary exertion, and of course there is not strength to repeat it often. We apprehend that this is the case with our present plant: having received an injury, it is capable of making a feeble effort to restore itself, and after that submits to its fate.

We have thus described faithfully what we have seen. If any one should doubt our solution of the phenomenon of the rings, perhaps if he resides for any length of time on the sea-side, and will take the trouble of marking any particular plant, and will cut, or rather break off, the extremities of the branches, possibly he may see the reparation made in the manner which we have mentioned.

It differs from *lumbricalis* by the wide opening of the ramifications of the branches approaching almost to a right angle; and from that and *radiatus* by the shortness and bluntness of the branches. *Lumbricalis* has these rings occasionally, but, being of a firmer texture, is more seldom broken off, and of course bears fewer marks of reparation.

Specimens whereon the rings are to be seen, remain in *Uvedale's Herbarium*, p. 9. n. 4. and in the Collection by *Buddle and Vernon*, p. 18. n. 5. This last answers very nearly to our description of var. β .

55. FUCUS RADIATUS.

F. fronde filiformi dichotomâ ramosâ, ramis subæqualibus acuminatis, angulis ramificationum obtusiusculis; tuberculis lateralibus.

F. rotundus. *Gmelin*, p. 110. t. 6. f. 3. *R. Syn.* p. 45. n. 24. var. ad finem.

Habitat in faxis marinis apud Cromer in Norfolciâ.

Adhæret faxi callo explanato, furculos emittente, unde novæ fiunt

fiunt plantæ—*Frons* teres, filiformis, sub-diaphana purpurea, 4—6 uncialis, crassitie fili emporetici minoris, dichotoma, ramosa, angulis ramificationum obtusioribus—*Ramorum* summitates attenuatæ, acutissimæ—*Fruclificatio*, tubercula hemisphærica verrucosa, magnitudine feminis rapi, distantia, ad latera ramorum.

This species is unnoticed in the *Flora Anglica*, but is certainly mentioned by Ray as a variety of *lumbricalis*, *Syn. p. 45. n. 24 ad finem*—‘*hanc speciem cum nodulis solidis per intervalla mediis cauliculis et ramulis innascentibus observavit rever. vir D. Manningham.*’—This description clearly points out the present plant. From Gmelin’s description of his *F. rotundus* we have no doubt of this being his plant; but the figure is bad, representing the summits very short and very obtuse, which in the growing plant are extremely acute. The tubercles are well represented as they appear in the dry, not in the recent plant—but we have never observed them so near the summits of the branches; from which, and from the short blunt terminations, it is probable the figure was taken from a specimen in which the extremities were broken off by the waves.

The plant, when growing, expands in a radiated or umbellated form, and has blunt angles; whence the rounded appearance of those angles when dry. The dichotomy is more exact in this species than in any of its affinities, the corresponding branches generally dividing very regularly at the same height. The perfect tubercles when recent, are of a pale pink or flesh colour, rough on the surface, and are extremely resembling to the head of the *Sphæria entomorrhiza* as represented in Dickson’s plate *Crypt. fasc. 1. t. 3. f. 4.*—In this state the seeds, which are of a full bright red colour, may be discerned with a good common eye-glass. When the plant is dry, the tubercles acquire the same colour as the rest of the plant.

Before the seeds are ripe, the tubercles appear as represented in Gmelin's figure, and have constantly one or two furrows across them. They are situated on the upper part of the frond, but not on the extreme divisions, and are usually distant, but sometimes two or three are found aggregate.

This species is readily distinguished from all its affinities, by its expanded leathery root—its very different mode of fructifying—its very acute terminations—and by its brighter and more transparent purple colour, which is clearly discernible when dry, if the plant be held to a strong light.

It grows on the large stones at Cromer on the coast of Norfolk, and is found amongst other rejectamenta at Yarmouth and other places to the southward.

56. FUCUS LUMBRICALIS.

F. fronde filiformi dichotomâ ramosâ, ramis sub-æqualibus acuminatis, angulis ramificationum acutis. Herb. Buddle, p. 11. n. 1, 2, 3. Petiver, p. 31. n. 8.

R. Syn. p. 45. n. 24, 25. Morison. Hist. Ox. f. 15. t. 9. f. 4. 9.

F. fastigiatus. Fl. Ang. p. 588. Fl. Scot. p. 930. Withering, vol. 3. p. 257. Gmelin, p. 106. t. 6. f. 1. Stackhouse, Ner. Britt. p. 15. t. 6.

F. furcellatus. Fl. Ang. p. 589. Fl. Scot. p. 930.

F. fastigiatus β. Withering, vol. 3. p. 258.

F. lumbricalis. Gmelin, p. 108. t. 6. f. 2. Fl. Ang. ed. 1. p. 471.

Habitat in littoribus marinis ubique.

Radix fibrosa furculos emittens e quibus frondes plurimæ exoriuntur—

antur—*Frons* individua 4—6uncialis, crassitie fili emporetici, teres, filiformis; primum simplex, dein ramosa, ramis dichotomis fastigiatis—In quibusdam plantis, ramorum apices breves, et in formam ovalem, hinc concavam, illinc convexam dilatatae—In aliis, *Frons* terminatur furcellis teretibus, incrassatis, uncialibus et sesquiuncialibus, mucilagine seminiferâ repletis—*Color* recentis plantæ nigro-rubescens, siccatæ nigerrimus.

The plant now described includes the two species of *fastigiatus* and *furcellatus* of Hudson and Lightfoot—and *fastigiatus* and β of Withering. But as the *fastigiatus* and *furcellatus* of Linnæus are now known to be different plants from either, we have thought it proper to give the name of *lumbricalis* to this species, after Gmelin and the first edition of *Flora Anglica*.

The late Mr. Lightfoot doubted whether his *fastigiatus* and *furcellatus* were distinct; and we have positive proof that they are not to be considered even as varieties, having in our possession a specimen gathered from the beach at Yarmouth, in which both are seen arising from the same root, and in which the dichotomy of one branch actually exhibits both sorts. This discovery has made it very difficult properly to describe this plant, the terminations being so very different under these varying circumstances. It seems however probable, that what has been called *fastigiatus* has not really any fructification; for though these oval terminations have on their concave side a mucilaginous appearance, no seeds are ever observed in them: but when the swelling forks of the other are in a mucilaginous state, the seeds imbedded in the mucilage are very apparent.

This species differs from *radiatus* in its fibrous root, the very acute angles of the ramification, and in its swelling pod-like extremities.

It

It differs from *fastigiatus* β *interceptus*, in its higher growth and larger size—in being usually destitute of geniculations—in its constantly regular dichotomous terminations—in having the extreme branches in the fructifying state, in which only it could be mistaken, much longer and thicker—and in colour, this being dark reddish and somewhat pellucid whilst fresh, though turning black when dry; in which state also the short oval terminations of the *fastigiatus* of the English authors contract and become subulate and acute. The differences between this plant and the *fastigiatus* of Linnæus are pointed out under that species.

It adheres to the rocks and stones by strong fibres, throwing out short creepers, which produce other plants, all together frequently forming large masses, and is found on almost every part of the British coast.

57. *FUCUS KALIFORMIS.* TAB. 18.

F. fronde filiformi sub-gelatinosâ tubulosâ ramosissimâ, ramis sparsis, ramulis sub-verticillatis subulatis obtusiusculis.

Habitat apud Weymouth. *D. Stackhouse*—inter rejectamenta maris apud Yarmouth in Norfolkciâ legimus, necnon apud Exmouth in Devoniâ.

Radix callus minimus crassus—*Frons* 4—6uncialis et ultra, filiformis, sub-gelatinosa, tubulosa, modò crassitiem pennæ corvinæ superat, modò passerinæ vix æquat—Statim a radice in ramos plurimos dividitur; hi rami aliis vix minoribus nunc oppositis nunc alternis, frequentius inordinatim positos ornati sunt—*Ramuli* supremi subulati, obtusiusculi, breves, sub-verticillati—*Fructificatio*, tu-



W.S.G. delin.

F. kaliformis.

bercula minuta sphærica, ex rubro nigrescentia ad latera ramorum ramulorumque sessilia—*Color* pallidè rubescit.

This elegant species approaches nearest to the *verticillatus* of Lightfoot, but appears to differ in substance, in colour, and in the form and disposition of the branches, as will be observed by comparing the descriptions together.

The substance of this is tender and approaching to gelatinous. The branches which divide directly from the root are filiform, tubular like those of *verticillatus*, but without any tendency to articulations as observable in the latter species. They vary extremely in size; plants found by Mr. Stackhouse on the coast of Cornwall exceeding the thickness of a crow's quill, whilst such as have been found on the beach at Yarmouth scarcely equal that of the sparrow. These branches have sometimes a waved or twisted mode of growth, but this appearance is not sufficiently constant to form a characteristic mark. The secondary branches vary extremely in their manner of proceeding from the primary: some are opposite, others alternate, but much the larger part appear to grow without any order. The extreme ramuli, which are short, subulate, and terminate rather obtusely, are very often verticillate, generally 3 or 4 in a whorl, and, when not regularly so, have always a visible tendency to that disposition.

The fructification consists of globular tubercles sessile on the sides of the smaller branches, so minute as scarcely to be distinguished by the naked eye, bright red, and when filled with seeds, nearly black. The colour of the specimens we have seen is a pale watery red; but it is not improbable but it may be sometimes found mixed with green, this change being observable in most of the gelatinous *fuci*. In a very young state its finer branches are sometimes

so attenuated at the base, as to appear to be leaves, not unlike those of *sedoides*.

We have received specimens of this plant from a variety of correspondents and friends, who one and all have sent it to us under the name of *F. verticillatus* of Mr. Lightfoot. It is a matter of great regret to us that we could not meet with his original specimen. If this be his plant, it is to be feared that his figure in the *Fl. Scotica* is not accurately drawn, the last division of the branches being more capillary than we have ever observed them to be—Or perhaps he had his figure taken from a plant more luxuriant in its form than our southern latitudes ever produce.

Our worthy and accurate friend Mr. Davies sent us a specimen very much resembling Mr. Lightfoot's figure in every respect except the capillary branches. He met with it on the coast of the Isle of Anglesey. Nevertheless it should be observed, that Mr. Lightfoot dwells very much on the capillary branches, making them a part of his essential character.

58. FUCUS CONFERVOIDES.

F. frone filiformi ramosâ, ramis sub-distichis sub-simplicibus setaceis; tuberculis lateralibus semi-globosis. Herb. Linn.

Buddle, p. 16. n. 12. Petiver, p. 30. n. 1.

R. Syn. p. 51. n. 3. and p. 50. n. 50. Act. Gall. 1712, p. 40. pl. 5. f. 9.

F. longissimus. Gmelin, p. 134. t. 13. Fl. Dan. t. 650.

F. confervoides. Linn. Sp. Pl. 1629.

F. verrucosus. Fl. Ang. p. 588. Withering, vol. 3. p. 256. Stackhouse, Ner. Britt. p. 26. t. 8.

F. flagelliformis. Fl. Scot. p. 928.

Habitat

Habitat in rupibus et faxis sub-marinis apud Cromer in Norfolciâ—Hastings Suffexiâ, et in Insulâ Portlandiâ.

Radix fibrosa—*Frons* cartilaginea, filiformis, teres, variat pro situ dodrantalis, etiam bipedalis; nunc fili emporetici minoris, nunc setæ equinæ crassitiem æquans—Statim a radice fit ramosa, ramis setaceis, vel simplicibus vel ramulis paucis sub-distichis instructis—*Fruclificatio*, tubercula semi-globosa crebra, magnitudine feminis sinapis ad latera ramorum ramulorumque sparsa—*Color* recentis plantæ purpurascens, siccatæ nigrescens.

This species differs from *albidus* by being longer, by its branches being much fewer, and not attenuated towards the base—by the disposition of its ramuli being distichous, and not on one side only of the branches—by having much more numerous and smaller tubercles, and these always semi-globose—and by its purplish colour. With the other species in this division it cannot possibly be confounded.

It varies considerably in length and thickness. When unimpeded in its growth, it is slender, long, and very little branched. Where it is more confined, it is thicker, shorter, and throws out more branches; which has occasioned it to be described by Dillenius, in *Ray's Synopsis*, twice at least; his *n.* 53. *p.* 51. being certainly this species in its lengthened, and *n.* 50. *p.* 50. the same in its shorter state of growth.

From comparing our specimens with those in the Linnæan Herbarium, it appears that both this plant, and our next, the *albidus* of Hudson, were considered by Linnæus as one and the same plant, for they are both styled by him *F. confervoides*. It is not therefore to be wondered at, that Linnæus refers to *verrucosus* Gmel. for a figure of his *confervoides*, which figure of Gmelin, from his descrip-

tion more certainly than from his representation, is *F. albidus* of Hudson.

That it is the *longissimus* of Gmelin cannot be doubted, and it appears from the note at p. 134, that he himself thought it to be *confervoides* Sp. Pl. though he did not venture to quote it as certain.

The colour is almost always dark purple, though sometimes it is mixed with green or dirty yellow. The tubercles are small, numerous, and nearly black. It adheres to the rocks and stones by small fibres, and is found on various parts of the British coast.

59. FUCUS ALBIDUS.

F. fronde filiformi subdichotomâ ramosissimâ, ramis sub-secundis; tuberculis lateralibus sub-rotundis depressis.

F. verrucosus. Gmelin, p. 136. t. 14. f. 1.

F. albidus. Fl. Ang. p. 588. Withering, vol. 3. p. 256.

Habitat in rupibus et faxis sub-marinis in Insulâ Portlandiæ—apud Christchurch—Weymouth.

Adhæret rupibus et faxis radice fibrosâ—*Frons* spithamæa, pedalis et ultra, cartilaginea, filiformis, teres, ramosissima, crassitie fili em-poretici, sæpiùs autem setacea—*Rami* primarii frequenter dichotomi, nonnunquam sparsi, ramulis crebris sub-secundis, basi attenuatis instructi; hi autem aliis ramulis brevioribus et tenuioribus obfiti—*Fructificatio*, tubercula variæ magnitudinis ad latera ramorum ramulorumque sparsa, ad primum semiglobosa, matura autem depressa et paululum umbilicata, scutellis lichenum exinde simillima—*Color* albescens vel fuscescens, rariùs purpurascens, plerumque pallidus.

This species is distinguished from *confervoides* by its shorter growth—by being more branched, the branches usually pointing one way, and the smaller ones attenuated at their base—and by the larger size and different shape of the tubercles; which when mature are depressed and umbilicated, exactly resembling the shields of some *Lichens*. From *purpurascens* it differs sufficiently in having lateral tubercles, and, as before mentioned, its branches pointing one way. It is unnecessary to point out any distinctions from the rest of this division.

The principal branches, which separate almost immediately from the root, and generally in a dichotomous form, are in this plant furnished with very numerous secondary branches, growing mostly from the upper side, and these are again beset with smaller: these branches are always smaller towards the base; arising as it were from a point, and then swelling; and are again tapered towards the summit. The fructification has been fully described. The colour is generally whitish, but sometimes with a tinge of brown or purple.

It is well described by *Gmelin*, p. 136; but the figure is not equal; the tubercles being represented too small, and the twisted appearance being probably the effect of drying. Mr. Hudson has referred to *albus Gm.* p. 138, as well as to *verrucosus*; but the former is described as having the tubercles all axillary, and must therefore be a different species. He also refers to *R. Syn.* 50. ‘*F. teres albus tenuissime divisus*,’ which is clearly *purpurascens*; the fructification being described as surrounding the branch, and not lateral, as in this species. We cannot find any species in Ray sufficiently certain to be quoted.

It adheres by its strong cartilagineous fibres to the rocks at Weymouth and Christchurch, and elsewhere on the southern coast;

and we have found it amongst other rejectamenta on the beach at North Yarmouth.

60. *FUCUS SUBFUSCUS.*

F. fronde filiformi ramosissimâ, ramis sparsis, ramulis subulatis sub-alternis; tuberculis racemosis sub-octospermis.

Act. Soc. Linn. I. p. 131. t. 12. *Withering*, vol. 3. p. 236.

Habitat in rupibus et faxis sub-marinis in littore Icenorum.

Radix fibrosa—*Frons* filiformis, teres, ramosissima, subfusca, semipellucida, semipedalis, crassitie fili emporetici—*Rami* similes plurimi sparsi; aliis paulò tenuioribus et apicem versus confertis, iterum ramosi—*Ramuli* subulati, sub-alterni, tenuissimi; in quorum aliis et ad latera, racemi brevissimi, tuberculis minutissimis lanceolatis pallidis—In tuberculis singulis, femina sex vel octo sphæroidea subfusca, bino ordine disposita.

This species is sufficiently distinguished from all its affinities by its singular fructification; and as an ample history of it has been given in a former volume of these Transactions, little need be added here.

It may nevertheless be proper to observe, that later and more particular observations have induced us to conclude that the peduncle more constantly approaches the form of a raceme than that of a panicle, and that the extreme ramifications cannot with propriety be considered as leaves, since they do not differ in substance or in shape from the rest of the plant. These circumstances have occasioned it to be necessary, to make some alteration in the specific character as formerly given, and to place it in the division *fronde tereti*, instead of *foliis unitis*, as before proposed.

It

It adheres, by short thick fibres, to the sub-marine rocks and stones at Cromer, and in various other parts of the British coast.

61. FUCUS PEDUNCULATUS.

F. fronde filiformi pinnato-ramosâ, ramis fetaceis simplicibus sub-distichis; tuberculis oblongis pedunculatis sparsis.

Fl. Ang. p. 587. Withering, vol. 3. p. 256.

Habitat in rupibus et faxis Insulæ Portlandiæ. *Fl. Ang.*—Inter rejectamenta maris apud Yarmouth in Norfolciâ.

Radix—————*Frons* filiformis pinnato-ramosa, teres, tenuissima, spithamæa, semipedalis, pedalis & ultra—*Rami* simplicissimi, fetacei, sub-distichi, inferiores longiores, superiores breviores, supremi brevissimi; cuncti tuberculis parvis oblongis sparsis obsiti—*Tubercula* feminibus repleta, pedunculis sibi æqualibus vel longioribus sustentata—*Color* totius plantæ ex olivaceo-flaves cens, pallidus.

This very elegant species is readily distinguished from its several affinities: from *tenuissimus*, by being only simply branched, and by the form of its tubercles; and from *asparagoides* also, by being simply branched, by its colour, and by not having fetaceous ramuli alternating with the tubercles.

The branches in this species are entirely destitute of any other ornament than the feminiferous tubercles; and its extremely delicate and slender make, as well as its general habit, sufficiently prevents the possibility of confounding it with any other in this division.

It is a particular circumstance belonging to this species, that we have rarely seen any specimens which were not infested with a minute green conferva, growing on almost all the tubercles, and

terminating the branches, rarely exceeding one line in length. The plant, when infested with this parasite, has a fringed appearance, and so extremely resembles the *gartnera* of Pallas, figured in his *Miscell. Zool. p. 199. t. 14. f. 24.* and again in Gmelin, *p. 164. t. 19.* that we are induced to believe they are the same; but not choosing to make any references, upon the authenticity of which we cannot absolutely rely, we have not ventured to refer positively to those figures.

We have never ourselves seen this plant in a growing state. Mr. Hudson says it is found on the sub-marine rocks and stones on the Isle of Portland: and we have in our possession specimens which were gathered amongst other rejectamenta on the beach at Yarmouth in Norfolk, and which were probably washed from the rocks on some part of the eastern coast.

62. FUCUS ASPARAGOIDES.

F. fronde filiformi ramosissimâ ; tuberculis globosis pedunculatis, ramulis subulato-setaceis alternatim oppositis.

Act. Soc. Linn. 2. p. 29. t. 6.

Habitat in faxis et lapillis marinis apud Cromer.

Radix fibrosa—*Frons* filiformis, teres, crassitie fili emporetici minoris, semipedalis, ramis sub-alternis iterum ramosis—Hi rami ramulis subulato-setaceis, sesquilineam circiter longis, pinnati sunt—*Frustrificatio*, tubercula globosa, pedunculata, magnitudine semina papaveris vix æquantia, ramulis alternatim opposita, et duplo breviora—*Pedunculi* longitudine tubercula æquant vel exsuperant—*Color* totius plantæ lætè ruber.

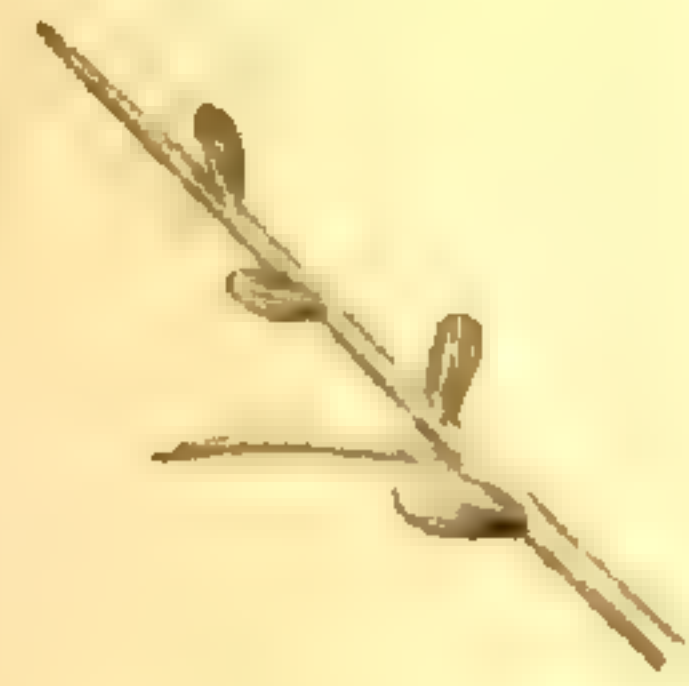
This beautiful species cannot be confounded with any in the same division,



fig. 1.



fig. 2.



F. tenuissimus.

M. S. G. de Lin.

division, unless *tenuissimus* and *pedunculatus*. It is easily distinguished from the first, by its pedunculated tubercles, from the branches having a subalternate mode of growth, and by the colour. It differs from the second, by being very much branched, by the shape of the tubercles, which alternate with the setaceous ramuli, and by the colour.

The whole plant is bright-red and pellucid. The tubercles, when filled with ripe seeds, are darker than the rest. The setaceous ramuli, which are twice and sometimes thrice as long as the tubercles with their peduncles, are so delicate, that the terminations are scarcely to be distinguished by the naked eye.

It adheres by small fibres to the stones and pebbles at Cromer; and has been found amongst other rejectamenta on the sandy shore at North Yarmouth.

63. FUCUS TENUISSIMUS. TAB. 19.

F. fronde filiformi ramosissimâ, ramis omnibus capillaribus alternis, ramulis acutis tuberculatis.

Ulva capillaris. *Fl. Ang. p. 571. Withering, vol. 3. p. 233.*

Habitat in lapidibus et faxis sub-marinis in Isthmo Portlandico—necnon in Fucis majoribus, præcipuè F. *vesiculoso* prope Weymouth, sub Speculâ Anglicè *The Look-out* dictâ.

Radix fibrosa, furculosa, unde frondes plurimæ simul enascuntur confertæ—Sæpe etiam frons solitaria oritur—*Frons* brevi post ortum intervallo ramosa fit, ramis capillaribus alternis—Hi rami iterum in alios plurimos paucosve pro re natâ abeunt—*Ramuli* extremi breves admodum, basi et apice attenuati acuti—Omnes rami ramulique omnino alterni sunt—*Altitudo* 2-uncialis, spithamalis, pedalis—*Substantia* tenera gelatinosa—*Color* pallidus albidus—*Fruetificatio*, tubercula

cula conferta, ramulos omnes apicesque ramorum obvestientia—In unoquoque tuberculo semen unicum minutum obovatum, hinc acutum pallidum, post exsiccationem rubicundum. Occurrit, sed rariùs, vesiculis globosis sessilibus, minutis.

We have been well assured that this plant is the *ulva capillaris* of Mr. Hudson. The fructification, however, which we have repeatedly examined in a recent state, under a very high magnifier, proves it beyond all doubt to be a *Fucus*. It has nothing in common with the genus *Ulva*, but its tender gelatinous substance. But this circumstance is no generic character.

In its habit, form and manner, it approaches somewhat to *F. pedunculatus*; but it is sufficiently distinct by being very ramose, and not simply pinnated, by the last divisions of its branches being linear and acute at each end, and not in the form of ovate-oblong pedunculated capsules: then it is a much smaller plant, and is parasitical, growing very frequent on the coarser *Fuci*, particularly on *F. vesiculosus*. The colour in both these plants is alike pale.

Lest any one may imagine that there is any danger of confounding it with *asparagoides*, it may be just mentioned, that the colour is always pale, and never red; and that it never has globose *pedunculated* tubercles, or any opposition to its branches.

In a recent state the seeds are nearly of the colour of the branches; but, when dried, they seem to be of somewhat a reddish colour.

It may be found adhering to the loose stones on the neck of the Isle of Portland; and under *The Look-out* at Weymouth we found it plentifully on the coarser *Fuci*, a little way beyond the low-water mark.

Its fine pale capillary branches (always alternate) make a pretty appearance floating in the water; and at once distinguish it from all others.

others. When growing on the loose stones in the Isle of Portland it is frequently infested with *Conserva æruginosa*.

Little globular transparent processes, resembling bladders, sometimes are to be found on the sides of the finer branches, which we have described as covered with minute tubercles—sometimes they adhere to the branches themselves, and appear to contain minute seeds; but this appearance is by no means constant. It is incredible how the plant is disguised when loaded, as it sometimes is, with these vesicles. See FIG. 2.

These processes rightly observed might perhaps help to elucidate the mode of fructification in *Fuci*. Perhaps the tubercles (which Reaumur asserts are capsules) are scattered in dusty clusters at first along the branches in an embryo state, as is observable in *Hypoglosson, alatus, kaliformis, &c. &c.* and at length one or more (the rest proving abortive) become fertile, and swell into complete form.

These processes appeared to us too seldom to deserve admission into the essential character. The finer ramuli usually are to be observed surrounded with minute tubercles—each tubercle contains a seed obovate, and acute at one end.

64. FUCUS ARTICULATUS.

F. fronde membranaceâ filiformi-tubulosâ concatenatim articulataâ ramosissimâ, ramis uniformibus dichotomis verticillatisque.

Herb. Petiver, p. 25. n. 5. Buddle, p. 12. n. 2. Morison, Hist.

Ox. 3. f. 15. t. 8. f. 4. Stackhouse, Ner. Britt. p. 28. t. 8.

a. b. Fl. Scot. p. 959. Withering, vol. 3. p. 240.

Ulva articulata. Fl. Ang. p. 569.

Habitat in faxis, rupibus, tignisque sub-marinis, necnon in Fucis grandioribus Devonix et Cornubiæ.

Radix callus minutus vix expansus—*Frons* 3—4uncialis, crassitie fili emporetici, membranacea, tenera, filiformis, tubulosa, omnino concatenatim articulata, ramosissima—*Rami* primarii sæpiùs dichotomi, aliis constanter verticillatis obfiti—*Ramuli* aut oppositi aut verticillati sunt, supremi frequentissimè dichotomi—Plantâ fructificante, ramuli unarticulati folia ovalia mentientes verticillatim positi articulos supremos circumdant, seminibus minutis rubris repleti—*Color* pallidè ruber vel purpurascens, nonnunquam olivaceo-viridis.

This plant has been arranged amongst the *Ulvæ* by Mr. Hudson, but was removed to the genus *Fucus* by Mr. Lightfoot, the fructification according with that genus; and this arrangement we choose to follow, there being no certain limits to be drawn between the two genera of *Fucus* and *Ulvæ*, but such as arise from the nature and situation of the fructification.

The jointed structure gives this species some affinity with the *Confervæ*, but the fructification again clearly points out the impropriety of placing it in that genus.

The figure of Morison well expresses the habit of the plant. The principal branches are usually dichotomous, and throw out, at intervals, whorls of somewhat smaller branches, usually four or five in a whorl, which are again divided into smaller, sometimes opposite, sometimes verticillate; the terminations are usually dichotomous. When in fructification, there are generally whorls of single joints, resembling oval leaves, surrounding some of the smaller branches; these perform the functions of tubercles, and contain numerous dark red seeds; and the same are also found in some of the terminating

nating joints. The colour is usually pale red or purple, but sometimes olive-green, and not unfrequently all are found intermixed in the same specimen.

It is found on all parts of the south and west coasts, growing on the rocks, and on the larger and coarser *Fuci*. We have also observed it on the wooden piles on the sides of the pier at Weymouth, and elsewhere.

The *F. repens* of Mr. Lightfoot is only a variety, or perhaps ought scarcely to be called a variety, of this species. The colour is of a darker or purplish red, but the disposition of the branches is much the same. As far as it has appeared to us, it may be deemed only the young or dwarf plant of *articulatus*.

65. FUCUS OPUNTIA.

F. fronde cartilagineâ sub-compressâ solidâ, concatenatim articulatâ, ramosâ, ramis uniformibus dichotomis.

Dill. 50. t. 10. f. 9. A. B. C. D.

Ulva articulata β *Huds. 569.*

Habitat apud Tenby in Walliâ Australi. *D. Stackhouse.*

Adhæret rupibus callo minimo furculos emittente, unde oriuntur cæspites densi, rupes lichenum more obvestientes. *Frons* vix uncialis rubra vel purpurea, nonnunquam paululum virescens, cartilaginea, articulata, sub-compressa, solida, ramosa. *Rami* dichotomi uniformes. *Articuli* ovales, quorum supremi tuberculorum officio funguntur, et feminibus minutissimis congestis fæti sunt.

We have never had an opportunity of examining this little plant ourselves on its native shores; but from the specimens which Mr. Stackhouse has been so obliging as to communicate, and to accom-

pany with very accurate observations, taken on the spot, we do not hesitate to describe it as distinct from *articulatus*. It differs in the texture, which is cartilaginous and solid; in the form of the articulations, which are broader and shorter, in proportion to the size of the plant, and which are usually compressed, though sometimes they may be found filiform; in the disposition of the branches, which in this are always dichotomous; and in colour, this being of a deep red or purple, whilst *articulatus* is always pale, though both species are subject to have the upper joints tinged with green. The place and mode of growth are very different, *articulatus* growing not only on the rocks, but being very frequently parasitical on the larger and coarser *Fuci*, which are usually submersed: *opuntia*, on the contrary, is always found on the naked, and often on the perpendicular rocks, between high and low water-mark. The frond adheres to these rocks by a small callous knob, from which shoots arise, which, where they touch the rock, adhere, and throw out branches; thus forming large tufts, exactly in the manner of the *Lichens*. The branches are dichotomous, but never verticillated in the manner of *articulatus*; and in these, we apprehend, as well as the terminal ones, the seeds are to be found.

66. FUCUS VARIABILIS.

F. fronde filiformi ramosissimâ, ramis subimbricatis, ramulis brevissimis fasciculatis acutis.

F. confervoides. *Fl. Ang.* 591.

Habitat inter rejectamenta maris apud Yarmouth in Norfolciâ—apud Exmouth in Devoniâ, sed rariùs.

Radix fibrosa furculos emittens, unde novæ oriuntur plantæ.

Frons

Frons semipedalis, filiformis, ramosissima: *Rami* nonnunquam alterni, frequentius sparsi et summitatem versus imbricati: *Ramuli* breves, fasciculati capillares; in plantis junioribus acuti, at mox longiores et obtufiusculi fiunt. *Color* junioris plantæ flavescens, senescentis niger. Substantia in juniore plantâ subcartilaginea, tenera, lævis; in senescenti, rigida, fragilis, scabra.

This plant has been called by Mr. Hudson *confervoides*; but that appellation having been given by Linnæus to the species described in the *Fl. Ang.* by the name of *verrucosus*, it has become necessary to give a new denomination to the present plant. We have adopted that of *variabilis*, as expressive of the changes it undergoes in the different stages of its growth, which are such, that were it not for one leading circumstance, which may be traced through all its changes, it would be almost impossible to recognize it in youth and age for the same species.

This marking feature consists in the short fasciculated acute *ramuli* which readily distinguish it from all other species, and which is consequently made the principal distinction in the specific character. These *ramuli*, in the young plant, form somewhat close *fasciculi*, are fine almost as a hair, and acutely terminated. As the plant advances, they appear of rather a stronger substance, and somewhat more spreading; and in age they become longer, though rarely exceeding two or three lines: they terminate obtusely, and appear somewhat multifid, as described in *Fl. Anglica*.

The young plant is subcartilaginous, but smooth and tender: in age it becomes rigid, fragile, and peculiarly rough to the touch, from the remains of the broken branches and *ramuli*. From these circumstances Mr. Hudson has described it '*fronde scabrâ,*' and '*ramulis denticulatis,*' taking part of his specific character very improperly:

properly from appearances which are not at all warranted by the examination of the young and undamaged plants, and are solely owing to the approach of age and decay. The young plants are of a yellowish colour, and somewhat transparent; in age they become black and opaque.

We have not met with it in a growing state, but have found it, with all its varying appearances, amongst the rejectamenta on the shore at North Yarmouth.

We have not yet had an opportunity of seeing it in fructification.

67. FUCUS PINASTROIDES.

F. fronde filiformi ramosissimâ, ramulis arctè imbricatis subulatis sub-secundis apice incurvatis integris.

Herb. Buddle, p. 18. n. 3. and p. 19. n. 4. R. Syn. p. 50. n. 46.

Gmelin, p. 127. t. II. f. I.

F. incurvus. Fl. Ang. p. 590. Withering, vol. 3. p. 259.

Habitat in rupibus et faxis sub-marinis passim.

Radix fibrosa—Frons filiformis, sublignosa, atro-rubescens, dorantalibus vel semipedalis, crassitie pennæ corvinæ, ramosissima—Rami ramulis densissimè imbricatis, subulatis, rectiusculis, incurvis et sub-secundis vestiti—Fructificatio, tubercula globosa magnitudine seminis rari, in ramulorum alis et ad latera, pedunculata et sessilia.

This species, one of the least elegant of the whole genus, is easily distinguished from its affinities by its thicker and more woody stem, and its closely imbricated branches, which, towards the extremities, are thickened into a scarcely distinguishable mass.

The whole stem, and the larger as well as the smaller branches,

are covered with subulate *ramuli*; and though they surround every part, yet, as they all turn upwards, they have the appearance of growing from one side only.—These are of various lengths, from one line to half an inch, and have frequently, when examined by a strong light, especially before they have been long exposed to the air, and are become shrivelled, the appearance of joints or medullary *septa*, proving this plant to be nearly allied to the *Conferva*. The fructification is notwithstanding certainly that of a *Fucus*.—It is found only amongst the extreme branches, and consists of globular tubercles, about the size of turnip-seed, mostly axillary, and supported on peduncles about half a line in length, but sometimes lateral; and, in this situation, both sessile and pedunculated. The colour of the recent plant is dark red, but, when dry, it is entirely black.

It adheres by its fibrous base to the rocks, and is found upon almost every shore.

68. FUCUS LYCOPODIODES.

F. fronde filiformi sub-simplici, ramis subulatis sub-ramosis undique imbricatis squarrosis.

Linn. Syst. Nat. 717. *Retz. Fl. Scand. Prod. ed. 2. n.* 1696.

Conferva squarrosa. Fl. Dan. t. 357.

Inter rejectamenta maris apud Yarmouth in Norf. invenimus.

Radix callus minutus vix expansus—*Frons* 6-uncialis et ultra, filiformis, crassitie pennæ corvinæ, modò simplex, modò ramis perpaucis instructa, radicem versus nuda, dein usque ad apicem ramulis brevibus subulatis, obtusiusculis squarrosis subramosis undique densè imbricata.

bricata—*Substantia* cartilaginea rigida—*Color* recentis plantæ fuscescens, siccatæ niger—*Fruëtificatio* incognita.

This species, which was unknown to any of our English authors as of British growth, is one of those in which the limits of the genera *Fucus* and *Conferva* too nearly approach each other; in consequence of which it has been considered by the author of *Fl. Dan.* as a *Conferva*, though placed by Linnæus in the genus *Fucus*.

The *frond*, of which three or four generally arise from the same base, is about six or eight inches high, either simple, or throwing out a few short branches, which are rarely again divided. The lower part, for about the space of an inch, is always naked; but the whole of the remainder, to the summit, is closely imbricated with short subulate branches, either simple or once divided, and terminating somewhat obtusely. These *ramuli* have frequently, but not constantly, a somewhat jointed appearance, which has occasioned its being considered by Oeder as belonging to the genus *Conferva*. As nevertheless the stem is perfectly free from this appearance, and the rough and squarrose habit of the plant accords better with the *Fuci*, and as it approaches considerably in habit and character to the *Fucus pinastroides*, which has also some of its extreme *ramuli* with a jointed appearance, we have thought it most proper to follow the authority of Linnæus, and arrange it as a *Fucus*.

The fructification has not yet been discovered, but will probably be found analogous to that of *Fucus pinastroides*, next in order to which we have placed it.

It has been found amongst other rejectamenta on the beach at Yarmouth in Norfolk.

69. FUCUS PURPURASCENS.

F. fronde filiformi ramosissimâ, ramulis fetaceis sparsis; tuberculis subrotundis innatis.

Herb. Buddle.

R. Syn. p. 50. n. 51. Fl. Ang. p. 589. Withering, vol. 3. p. 259.

F. tuberculatus. Fl. Scot. p. 926.

Habitat in rupibus et faxis sub-marinis ubique.

Adhæret faxis fibris aliquot crassiusculis—*Frons* filiformis, teres, cartilaginea tenera, pedalis et ultra, crassitie pennæ corvinæ, continua; ramis nunc oppositis, nunc alternis, plerumque autem sparsis instructa—*Rami* inferiores longiores, supremi brevissimi; ramulis numerosissimis sparsis, nonnunquam etiam confertis tenuioribus vestiti—*Ramulis* per intervalla innata sunt tubercula subrotunda seminifera a se invicem distantia—*Color* purpurascens, aut ex purpureo et virescenti-albescens.

This species differs from all its affinities by its fructification, which consists of roundish, or sometimes oval swellings, placed at some distance from each other on the smallest branches, and which, when the plant is mature, may be observed to be filled with blackish purple seeds. These are never terminal, as described by Gmelin; for, when they appear to be so, there may always be observed a subulate process, which is, in fact, the extremity of the branch extended beyond the tubercle.

The fructification of this plant is truly an innate tubercle, which occupies the central part of the branch, and, as it swells, causes that to dilate, and to form the gouty knot which is externally observable. The substance of the branch is no ways altered by this

process, as may be easily seen in the gelatinous variety, which is usually of a pale colour, and has a considerable degree of transparency.

The substance of the plant, though cartilagineous, is tender, and in some specimens very much approaching to gelatinous. The principal stem is continued throughout, and is generally naked for a small space at the base, after which it is thickly clothed with branches, of which those below the middle are longest, and the upper very short, giving a lanceolate outline to the whole frond. The primary branches are sometimes opposite and sometimes alternate, but much more frequently grow without order—these are again once or twice branched, and the terminal ones are not unfrequently crowded. The colour is sometimes wholly purple, but more frequently a mixture of dirty white, green, and purple; and the more the plant approaches to being gelatinous, the less purple is to be observed in it.

That this is the species described in *R. Syn. p. 50. n. 51.* under the name of '*Fucus teres albus tenuissime divisus,*' no one who reads the description there given can doubt, ('*crebris sæpe nodulis donatur, quæ non ad latus hærent, sed ab ipsis cauliculis transfadiguntur*') though Mr. Hudson has unaccountably referred this synonym to his *albidus*, the fructification of which he describes as lateral. Gmelin, following the first edition of *Flora Anglica*, has given this synonym of Ray to his *albus*, in which he has fallen into a double error; for not only the synonym really belonged to his *purpureus*, the *purpureus* of Hudson's first edition, and *purpurascens* of the second, but also the *albus* of *Fl. Ang. ed. 1.* the *albidus* of the second edition, ought not to have been referred by Gmelin to his *albus*, but to his *verrucosus*, as Mr. Hudson has rightly done in his second edition. There can be no doubt but the *purpureus* of Gmelin belongs to this species, though
his

his description is not perfectly clear; and we have never observed the blackish spots with which it is there said the whole plant is sprinkled.

Mr. Lightfoot described his *tuberculatus* as being branched directly from the root; and we have in our possession a Scottish specimen which agrees with that description, but have never observed any English ones answerable thereto. This may possibly be Ray's '*Fucus teres rubens ramosissimus*,' though, for want of the fructification being described, it is impossible to ascertain whether that be *conservoides* or a variety of this species.

It is found adhering to the sub-marine rocks and stones on almost every part of the British coast.—The *var. β*, described by Mr. Lightfoot, we have never yet seen.

70. FUCUS AMPHIBIUS.

F. fronde filiformi ramosissimâ, ramis alternis; ramulis capillaribus, apice involutis tuberculatis.

F. scorpioides. *Gm. p. 135. R. Syn. p. 38. n. 4. t. 2. f. 6. Fl. Ang. p. 590. Withering, vol. 3. p. 260.*

β Ramis crassiusculis, erectiusculis.

Habitat in rupibus, faxis sub-marinis, et ad radices plantarum in fossis et palustribus maritimis frequens. *Hudson*.—Inter rejectamenta maris apud Yarmouth in Norfolciâ legimus—*β* prope Exmouth in com. Devon.

Radix fibrosa—*Frons* gregaria cartilaginea, filiformis, teres, uncialis vel sesquiuncialis, crassitie setæ porcinae, ramis alternis patentibus—*Ramuli* capillares brevissimi alterni, patentes; supremi incurvi, tuberculis mucilaginosi seminiferis involutis—*Color* ex fusco-virescens.

This curious little plant is sufficiently distinguished from all in this division by its humble growth, and its peculiar fructification.

The specimens which we have seen of our first variety have rarely exceeded an inch in height: the primary and secondary branches are alternate, very much spreading; the extreme branches absolutely capillary, generally alternate, but not unfrequently dichotomous, and, in this case, forming very obtuse angles. The extremities are rolled spirally, and usually include in their convolutions either single or aggregate mucilaginous tubercles.

The figure in *R. Syn.* very accurately represents this plant; but *Pluk. Phyt. t. 47. f. 13*, quoted by *Gmelin*, does not at all resemble any specimens which have fallen under our observation. We have therefore omitted to refer to it, convinced that nothing tends more to confound the unpractised botanist, than references to erroneous or doubtful figures.

Our second variety, whether from its adhering to larger substances, or enjoying a more fertilizing spot, or from the mere effect of age, is much larger, oftentimes above two inches high; the main branches also are larger and coarser, and the finer branches not so capillary or divaricating. However, the essential character, viz. the convolution of the tips of the finer fruit-bearing branches, is equally conspicuous in this as in our first variety.

71. FUCUS PLICATUS.

F. fronde filiformi dichotomâ ramosissimâ æquali, ramulis subsecundis; tuberculis lateralibus terminalibusque.

Herb. Buddle, p. 11. Petiver, p. 27. l. 2. R. Syn. p. 45. n. 26.

Pluk. Phyt. t. 184. f. 2. Gmelin, p. 142. t. 14. f. 2. Fl.

Dan. t. 408. Fl. Ang. p. 589. Fl. Scot. p. 929. Withering,

vol. 3. p. 258. Stackhouse, Ner. Brit. p. 23. t. 7.

Habitat in rupibus et faxis sub-marinis passim.

Radix———*Frons* cartilaginea filiformis, teres, ramosissima, purpurascens vel flavescens, dodrantalis, crassitie chordam musicam minorem æquans, a basi usque ad apicem æqualis—*Rami* confertissimi, implicati, incurvi, sub-secundi; terminales constanter dichotomi—*Fructificatio*, tubercula minutissima ad latera et ad apices ramorum atro-purpurea.

This species is sufficiently distinguished from all its affinities by its numerous and thickly matted branches, which do not vary in size from the base to the extremities. The colour varies, purple and waxen; and frequently both are mixed in the same plant. The substance is cartilaginous and wiry, extremely brittle when dry.

The fructification, which was unknown to Gmelin, is described by Lightfoot as consisting in minute tubercles, growing without order on the sides of the branches. We have, besides these, observed the extremities of the branches dilated into similar tubercles—both are so small as scarcely to be distinguishable with the naked eye. The whole plant is diaphanous, except the tubercles when filled with seeds. It is found on various parts of the British coast, but is rarely met with in fructification.

72. FUCUS BYSSOIDES.

Fronde sub-quadripinnatâ, ramis ramulisque omnibus alternis, primariis longissimis, ultimis brevissimis fasciculatis tenuissimis.

Habitat inter rejectamenta maris in Insulâ Sheppey, apud Hastings, Weymouth, Exmouth, et alibi—haud infrequens.

Radix fibrosa—*Frons* tenera diaphana, filiformis, ramosissima, sub-quadri-

quadripinnata, ramis ramulisque omnibus alternis—*Rami* primarii longissimi tenues admodum, etiam capillares—*Ramuli* ultimæ divisionis tenuissimi brevissimi fasciculati—*Fructificatio*, tuberculum minutum ramulos nonnunquam terminans sæpius laterale—Ad omnem fere rami ramulive ortum geniculum est, unde confervis nimium affinis—*Color* amœnè ruber—*Altitudo* biuncialis—pedalis.

It must be allowed that this plant has all the habit and appearance of a *Conferva*. All the branches seem jointed. But two remarkable occurrences deserve notice—First, that these joints are observable only where there is a branch, or where one has issued forth—and, secondly, that a parenchymous dark line seems to run up the thicker branches, and that this joint often ends in the parenchymous line, and does not always pass through the whole substance to the opposite side. This by no means accords with the nature of a *Conferva*, whose joints are annular strictures, and equally visible on all sides. As, therefore, the joints are not at regular distances, nor always complete and perfect, there is certainly much room to doubt to which family it most properly belongs. We must beg leave to call upon those who have better opportunities, to watch it in its different states, and determine upon surer grounds.

When first thrown up on the shore, it is of a beautiful red colour, perfectly capillary. All its branches are alternate. The main stem or stems (for sometimes there are more than one) run up to the length oftentimes of nearly a foot, sometimes not above two inches. The branches of the first order are somewhat long, those at the base longest, gradually diminishing in length towards the top. The branches of the second order are short, observing the same gradation, in point of length, as the former. Those of the

other orders are *extremely* short, usually much crowded together in clusters. The whole frond is very tender and transparent. In drying it often assumes a dark or black red colour.

It seems to be a parasitical plant, as its root appears usually altogether entangled in a mass of some fine *Conferva*, matted like the *C. bullosa*. It is by no means an uncommon plant.

It is very rarely to be met with in fructification. The fructification is very minute, sessile tubercles, containing seeds, situated at the ends, and on the sides of the smaller branches. We have seen some *Confervæ* with similar appearances*.

WE have thus endeavoured to make out as complete a catalogue of the British species as our present means and opportunities have enabled us to ascertain. We have had to wait year after year for the appearance of fructification in some species which rarely occur in that state. Some few have never yet appeared to us with any sign of flower or tubercle at all. *F. ligulatus* and *tomentosus*, in particular, are extremely equivocal in this respect. But from some late communications from Mr. Stackhouse, we have reason to expect that the fructification of *tomentosus* will not long remain concealed.

* In our Synoptic Table we have called this plant *Fucus capillaris*, upon a supposition that Mr. Hudson had designed this plant under that denomination. But since the printing of that part, Sir Thomas Frankland, Bart. F. R. S. has honoured us with some very valuable communications. Among other things he has sent us specimens of Hudson's real *capillaris*, and has assured us that this is *Conferva Byssoides* of Mr. Lightfoot's MSS. We have therefore adopted that trivial name. But we differ from Mr. Lightfoot, in associating it with the genus *Fucus*, for reasons above mentioned. It is too late now to avail ourselves of Sir Thomas Frankland's remarks; but these and other matters, which have come to our knowledge since the conclusion of this tract, will be the subject of a supplementary paper.

This

This gentleman, fortunately situated near the Cornish coast, perhaps the most prolific in *Algæ* of any part of the British shore, is pursuing, with unremitting ardour, the investigation of the physiology of the marine plants; and, from the discoveries he has already made, expectations may be formed that some very valuable ones respecting this desideratum, may be obtained from his researches.

While, therefore, we are presenting our list of species, so far from deeming it or wishing it to be thought complete, we beg leave to profess how conscious we are of imperfection, and how fearful we are of many important omissions. We have only to console ourselves that we have spared no pains in investigating, and faithfully describing every thing within our reach. Hence we flatter ourselves that we have added somewhat to the general stock of knowledge upon this subject. We must add, that we have received from Mr. Stackhouse specimens of three or four undoubtedly new species of *Fucus*; but as he is engaged in an excellent work on this subject, part of which he has already published under the name of *Nereis Britannica*, we did not think ourselves authorised to anticipate his publication by describing those species. We shall endeavour hereafter to incorporate them into our system.

One great source of difficulty, in executing this treatise, took its rise from the very great mistakes which appear in authors of the first respectability. Thus Mr. Hudson had arranged our *Fucus tenuissimus* amongst his species of *Ulva*, and had called it *Ulva capillaris*. He had made *F. inflatus*, a plant of the division *Alati*, to be a variety of his *Ceranoïdes*, the *Crispus* of Linnæus, one of the division *Fronde planâ aveniâ*. These and numberless errors of the like kind we detected, partly by waiting for specimens in proper fructification, partly by consulting the Linnæan Herbarium, now, fortunately

fortunately for science, in the possession of our worthy President Dr. Smith ; and partly by having recourse to Sir Joseph Banks's kind indulgence; without whose favour, and free leave to consult his extensive collection of books and specimens, how could this, or indeed how can any tract of labour and difficulty hope to boast of tolerable perfection ?

We want words also to express our high sense of Her Majesty's most gracious condescension, in not only permitting Dr. Goodenough to consult Mr. Lightfoot's collection of plants, which she purchased upon his death ; but, with the most attentive kindness, in directing every paper which could furnish him with any information to be submitted to his perusal ; and even personally assisting and encouraging him. When such elevated rank deigns to add encouragement to science, gratitude is not wanting, nor a due sensibility of the goodness of the act ; neither is it possible that labour, however severe, should sink into weariness—all is ardour, and happiness, and promptitude, and respect, and duty.

Much was gained by this consultation. It was found that Mr. Lightfoot's *spiralis* was the true plant of Linnæus ; his *distichus* the *ceranoides* of Linnæus ; his *ceranoides* the *crispus* of Linnæus ; his *ceranoides* var. *δ lacerus* (which is a variety of Mr. Hudson's *canaliculatus*.—How do the learned differ !) our *mammillosus* ; his *concatenatus*, the same as Mr. Hudson's plant of that name, the *fœniculaceus* of Linnæus ; his *esculentus* comprehends both our species *tetragonus* and *teres* ; his *rubens* our *sinuosus* ; his *endiviæfolius* the *crispatus* of Hudson, our *laceratus* var. *crispatus* ; his *nereideus* our *corneus* var. *filicinus*, the *filicinus* of Mr. Hudson ; and his *vermicularis* perfectly distinct from Mr. Hudson's *ovalis*. Mr. Lightfoot's *F. verticillatus* unfortunately had been mislaid, so that no opportunity offered of proving that species from his original specimen. This defect has

been supplied by several of our friends and correspondents, particularly by our worthy and accurate friend the Rev. Hugh Davies, F. L. S. of Aber near Bangor, by whose assistance we have been enabled to determine it to be our *kaliformis*.

Mr. Hudson was our chief guide in enumerating the species. But we could not follow him altogether. His having added no descriptions to his equivocal plants, leaves us extremely in the dark concerning his real determination. These doubts, in consequence of the loss of his herbarium, cannot now be cleared up. Some species we know are not existing. His *F. filiformis* must be suspected to be our compressed variety of *crispus*, only of a larger and more robust form. His *imbriatus* is our fringed variety of *membranifolius*; his *setaceus* is merely *fibrosus* in a young state, in which the leaves are perfectly setaceous; his *volubilis* is a twisted variety of *vesiculosus*; the *volubilis* of Linnæus is not of British growth: his *pinnatifidus* and *multifidus* are one and the same plant, named only after the different forms it assumes from the different accidents of its growth and station; his *corneus*, *pinnatus*, and *filicinus*, are also varieties only of one individual; his *cartilagineus* appears, from his quoting Buddle, evidently to be our *coronopifolius*, not the *cartilagineus* of Linnæus; his *furcellatus* the *lumbricalis* of Gmelin, not the real Linnean plant; his *muscoides* a variety of *aculeatus*, with the branches somewhat round; and his *lanosus* is the *Conserva polymorpha*. These two last we have accordingly struck out of our list entirely.

With all due deference to Major Velley and Dr. Withering, we have omitted their *F. elminthoides* and *defractus*, the fructification appearing to us, from the few specimens which we have seen, to be that of the genus *Ulva*. It is with much diffidence that we dissent from them; we flatter ourselves that we are all actuated
by

by one common spirit of research after truth, and pursue it with equal disinterestedness. As we have endeavoured to fix a true generic character for *Fucus*, *Ulva*, and *Conferva*, we wish to abide by our own rules.

Whatever we have said in this tract, we again beg may be brought to the test of the closest examination. Particularly we wish that gentlemen of science resorting to the sea-side, and especially those who are resident on it, would omit no opportunity of examining the growth of marine plants, their various appearances, and the progress of the parts of fructification. We are confident of nothing, but that we have stated what we have actually seen. In a subject so intricate as this, it would be highly advisable that all prejudices, and all comparisons and ideas of analogy taken from plants growing on land, should be entirely laid aside. This firmness of thinking led to a better illustration of the natural orders of the genera, by the indefatigable Jussieu; to a deeper investigation of the nature and properties of the seed, by the celebrated Gaertner; and of the mosses, by the illustrious Hedwig. Why should it be thought impossible, that the submarine plants, like the animals of that element, should have powers and properties new, original, and peculiar to themselves? The power of God is over all his works, and is seen, to the astonishment of man, in the variety of his wonders. But what can equal the satisfaction which he must feel, to whose patient and unwearied observation the discovery of this hitherto latent process shall be made manifest? What labour would not be well repaid by the discovery of another chain of reasoning, leading us to a farther confirmation of the existence and operations of the eternal Godhead?

XX. Description of *Ulva punctata*. By John Stackhouse, Esq. F. L. S.

Read May 5, 1795.

U L V A P U N C T A T A.

ULVA dichotoma, membranacea, diaphana; segmentis latis, uniformibus, apice furcatis; fructificatione globosa, sessili, in maculis oblongis per totam frondem glomeratim disposita.

Sp. nov.

An inter *Ulvas* vel *Fucos* annumeranda sit species hæc, haud equidem, ut opinor, satis liquidò constat. *Altitudo* sexuncialis; *latitudo* segmentorum vix uncialis: apices obtusi, furcati. *Habitus* dichotomus. *Substantia* frondis tenuissima, pellucida. *Fructificatio* per totam frondem ordine bino, glomeratim disposita: tubercula singula, rotunda, glabra, sessilia, atro-rubentia. *Frons* enervis, e basi tuberculata, subtus plana, faxis adhærenti exoritur.

Hab. ad oppidum Weymouth in arena juxta portum.

Dotted Ulva.—Frond dichotomous, membranaceous, transparent: the divisions wide, uniform, bluntly forked. Fructification in patches; tubercles crowded, round, smooth, without footstalks, dark-red colour.

Observations.

Observations.

The substance of this rare plant is as thin as goldbeaters' skin, or the membrane of *Ulva umbilicalis*. It arises from a little knobby root, flat at bottom; and grows in a crowded mass. It is perfectly dichotomous, the segments broad, of an equal size, forked obtusely. Its colour is brown, and pellucid as a bladder. The fructification covers the whole frond, in two rows of oblong patches, studded thick with small, round, dark-red granules. This plant has, I believe, never been noticed; it is, probably, a native of deep waters, and, from the delicacy of its texture, seldom thrown on shore perfect. Mr. Woodward, who has seen the specimen, thinks the fructification too regular, as to situation on the frond, for the genus *Ulva*; otherwise it would fall under his division of Fruit-bearing *Ulva*.

Hab. Thrown on shore on the sands at Weymouth, near the pier, at low-water mark, September 1792.

XXI. *Observations on the Genus of Porella, and the Phascum caulescens of Linnæus. By Mr. James Dickson, F. L. S.*

Read May 5, 1795.

THE genus of *Porella*, first established by Dillenius, and from him copied by Linnæus, who never saw the plant, had long appeared to me to be very doubtful: I had, however, an opportunity, some time ago, of satisfying myself on this subject. I happened to receive some mosses as package to plants from America; and, upon examining them, found a *Jungermannia* and a *Splachnum* in fructification. I suspected the *Jungermannia* to be the same with the *Porella* of Dillenius; but this could not be ascertained without actually comparing the two specimens, which I had an opportunity of doing by the indulgence of Dr. Sibthorp, of Oxford, who permitted me to compare my mosses with Dillenius's original collection; and, upon the most careful examination, I found my *Jungermannia* to agree exactly with his *Porella*, but could find no fructification upon his specimen.

As I have no doubt that my *Jungermannia* and his *Porella* are one and the same plant, I shall next endeavour to trace how Dillenius has fallen into this error; for the plant has exactly the habit of a *Jungermannia*.—This was, probably, by receiving an imperfect specimen; as the vagina, when damaged either by the weather or by insects, after the tender flower had fallen off, would very much resemble the capsule which he has figured.

His figure of the plant is too much crowded with leaves; but in his original drawings in the possession of Sir Joseph Banks, the



leaves, so far as they are represented, are placed in the same manner as in the annexed figure.

I shall now subjoin a short description of it under the name of

JUNGERMANNIA porella. Tab. 20. Fig. 1.

J. furculis pinnatis ramosis medio floriferis, floribus subsessilibus, vaginis obovatis inflatis.

Habitat in Pennsylvania.

DESCR. *Surculi* decumbentes ramosi. *Folia* alterna, obovata, perforata, pellucida, subtus auriculata. *Vagina* subpedunculata inflata, exiguis aliquot ad basin squamis cincta. *Seta* brevissima.

The *Splachnum* which I received at the same time with the above, when compared with Dillenius's specimen, proved to be the *Sphagnum* figured in Tab. 85. f. 15.;—the figure is remarkably stiff. This is made a *Phascum* by Linnæus; but with equal impropriety, it being a true *Splachnum*.

SPLACHNUM caulescens. Tab. 20. Fig. 2.

Spl. caulescens, foliis linearibus apice setaceis.

Habitat in Pennsylvania.

DESCR. *Caules* filiformes erecti; *folia* alterna, inflexa, reticulata, pellucida; *capsula* erecta cylindrica.

EXPLANATION OF TAB. 20.

- Fig. 1. A *Jungermannia porella*; natural size.
 B _____ capsule magnified.
 C _____ part of the plant magnified.
- Fig. 2. A *Splachnum caulescens*; natural size.
 B _____ magnified.
 C _____ a leaf magnified.

XXII. *Description of the Ribes spicatum.* By Mr. Edward
Robson, A. L. S.

Read July 7, 1795.

RIBES SPICATUM. Tab. 21.

RIBES inerme, spicis erectis, petalis oblongis, bracteis flore
brevioribus.

Habitat in sylvis. Near Richmond in Yorkshire, and between
Piersbridge and Gainford, in the county of Durham. h. v.

DESCRIPT.

Frutex erectus, 4 seu 5 pedalis.

Caulis inermis, ramosissimus.

Rami alterni erecti.

Cortex fusco-cinereus.

Folia alterna, erecto-patentia, petiolata, subcordata, triloba quin-
quelobaque, rugosa, inæqualiter ferrata; ferraturis lobisque
acutis: supra subglabra, subtus tomentosa, juniora tomen-
tosiora, inodora.

Petioli subteretes, foliorum longitudine.

Spicæ solitariae, laterales numerosae, erectae, bracteatae, 1—1½ pol-
licem longae.

Flores



Flores numerosi, sessiles, patentes, 2—3 lineas lati, ad summum spicæ conferti.

Braçtea subter florem, germine brevior, ovata, concava, apice reflexa.

Calyx. *Perianthium* monophyllum, semiquinquefidum, laciniis cuneato-subrotundis, erecto-patentibus, rubido-fuscis præter margines subvirides.

Corolla. *Petala* quinque, cuneato-oblonga, erecto-patentia, minuta; calyci inter singulas divisuras inferta.

Stamina. *Filamenta* quinque erecta, corollæ longitudine, calyci inferta, et ejus laciniis opposita. *Antheræ* triloculares.

Pistillum. *Germen* subrotundum, inferum, glabrum.

Stylus bifidus, staminum longitudine.

Stigmata obtusa.

Pericarpium. *Bacca* globosa, laciniis calycis coronata, unilocularis; colore et gustu *R. rubro* similis.

Semina subrotunda (5—10) fibris baccæ affixa.

Observationes.

Non attentè spectantibus, *spicatum* et *rubrum*, dum nondum se pandunt, magnam inter se similitudinem habere videntur; sin autem oculis intentis scrutentur, patefactum fit, plus illud foliorum pronò tomentosum, ac ferraturis lobisque acutum, quam hoc, esse — Cum vero florescunt, *spicatum* a *rubro*, quod illius rubido-fusci, hujus sunt flores luteolo-virides, at etiam ejusdem generis adhuc repertis, quod illud spicis erectis ornatum est, differt.

XXIII. *Observations on the Insects that infested the Corn in the Year 1795.*
In a Letter to the Rev. Samuel Goodenough, LL. D. F. R. S. Tr. L. S.
By Thomas Marsham, Esq. Sec. L. S.

Read May 3, 1796.

DEAR SIR,

TOWARDS the end of July last, a friend of mine (Mr. Long) who had the management of a farm in Hertfordshire, was telling me that an insect had made its appearance among the wheat, which threatened to do much mischief; that it was found, in many instances, to have attacked one, two, or more grains in an ear; and that it was discoverable by those grains appearing yellow, or as it were ripe, while all the remaining grains in the same ear were perfectly green.—I desired that gentleman to bring me up some of the diseased ears, which he did; and I found them exactly as he had described them.—On opening those grains that seemed diseased, I found in many of them an orange-coloured powder, and in several, one or two very minute *larvæ*, differing in colour, from a yellowish white to a deep yellow. They were too minute for examination by the naked eye; but by applying a deep magnifier I perceived them to be the *larvæ* of a small *musca*, and to resemble very much those aphidivorous *larvæ* that produce one particular family of the *muscæ*. They were thick at one end, and gradually diminished to a point at the other, where the head was situate. They extended and contracted themselves at pleasure; to which was added

added a leaping motion, frequently jumping full half an inch from the paper on which I examined them. The grain where these insects had possession appeared a little shrunk. Besides these *larvæ*, I frequently met with the *Thrips physapus* running about between the husks, and also several very small *Ichneumons*, one of which settled upon a *larva* while under my glass; and I saw it repeatedly wound the little maggot with its tube, and I have no doubt it deposited its eggs. This was seen also by Mr. M^cLeay, F.L.S. who was examining them with me.—I placed this wheat in water, and Mr. Long continued to supply me with fresh ears every week; and also, at my request, tied some gauze round several of the diseased ears, while growing in the field, which stood until the corn was ripe; but I was not able, with all my care, to discover the fly produced from the before-mentioned *larva*. Anxious, however, to determine, if possible, the history and progress of this little animal, which now seemed to create universal alarm; and knowing that my various avocations would prevent my quitting London; I had written, on the first hearing of the insect, to several of my friends who reside in the country, and to you among the rest, requesting their particular attention to this subject, and the result of that application I now give you.—From the observations you were enabled to make, you will remember that you had observed only the *Thrips physapus*, which you concluded to have been the insect, if it was an insect which did the mischief, although you could not discover any material injury that had occurred.—From our truly valuable friends Wm. Markwick, Esq. of Catsfield, near Battle, and the Rev. Wm. Kirby, of Barham, of whose accuracy and attention to this subject we have both received very convincing proofs, I received the following accounts.

Mr. Markwick, in his letter of the 9th of August, says: “I repaired immediately to my wheat fields on receiving your letter,
I i 2 “ and

“ and gathered such as I thought appeared to answer best to your
 “ description of diseased ears, and brought them home for inves-
 “ tigation. From your account of the destructive properties of this
 “ little insect, I expected to find it buried in the very heart of the
 “ grain, after having eaten its way thither; but, to my great satis-
 “ faction, no such thing has yet occurred; and, from what I have
 “ hitherto observed, I have great doubt with respect to its *destructive*
 “ *properties*. This opinion may perhaps surprize you; and my own
 “ future observations, as well as those of your more skilful and
 “ learned friends, may possibly prove me in an error; but my rea-
 “ sons for thinking so at present are, that when in the field the crop
 “ appeared to be very fine, and I had great difficulty in finding any
 “ ears that I supposed to be diseased. In some few ears I found the
 “ insect lodged between the husks or outward scales of the *calyx*;
 “ nay, even in those where I found the insect, the grain itself did
 “ not appear to have received any injury, only the husk seemed
 “ rather discoloured. I think I have discovered this little insect
 “ both in the *larva* and *chrysalis* state; but it is so minute, that I
 “ will not be positive whether what I took for the *chrysalis* was not
 “ a dead insect. I have placed all that I have yet found in an open
 “ box, along with some ears of wheat, and covered it with fine
 “ gauze, to prevent the fly, or perfect insect, from escaping, when it
 “ comes forth. If I should be so fortunate as to succeed in this,
 “ or can make any further observations towards investigating the
 “ natural history of this little animal, you may depend on hearing
 “ from me again. It is with great pleasure that I can, I believe
 “ with truth, inform you, that our wheat in general is very fine
 “ this year, the grain large and full, and a prospect of its yielding
 “ well when it comes to be threshed.”

In a letter dated Oct. 1, 1795, the same gentleman adds, “ I was
 “ in hopes that I should have been able to trace the minute insect

“ which was lately found in the ears of wheat, through all its
 “ changes; but am sorry to say that my researches have not been
 “ attended with that success I could wish. I have never met with
 “ it in the state of a small *white larva*, as you describe it to be at
 “ first. But whenever I have seen it, its first state was a very small
 “ *caterpillar* or *larva*, of a bright yellow colour, which had neither
 “ legs, antennæ, nor wings (See tab. 22, fig. 1 and 2), and which
 “ changes into an egg-shaped *chrysalis* of the same colour (See tab.
 “ 22, fig. 3 and 4.).

“ In my former letter to you, I speak of this *larva* as being found
 “ only between the outer hulks or scales of the *calyx*. But this is
 “ not always the case; for I have since found it between the *corolla*
 “ and the grain, and even on the grain itself; but amongst the vast
 “ number of grains which I have examined, I could never clearly
 “ discover that this insect had eaten into any of them. I have fre-
 “ quently found it sitting on fine full grain, which did not appear
 “ to be injured in the least. Sometimes indeed I found it on grain
 “ that was blighted, or shrivelled; but even then I could not dis-
 “ cover that it was eaten by the insect. In those ears where I
 “ found these insects (to the number, perhaps, of two or three,
 “ seldom more, in one ear), the grains were in general full, and not
 “ eaten at all. In one ear, containing 33 grains, I found four of
 “ these insects, three of them on one single grain; yet neither that,
 “ nor any of the other grains in the same ear, was eaten in the
 “ least. In short, from all that I have been able to observe, I am
 “ persuaded that the wheat has received no damage from these very
 “ minute insects; for, being so minute, they must abound in im-
 “ mense numbers to do any material mischief, even supposing them
 “ to feed on the grain; neither of which is, I believe, the case:
 “ for their numbers were, comparatively speaking, small; in most
 “ of

“ of the ears which I examined, none at all. And when I did find
 “ them, there were but few, and these few had not, that I could
 “ discover, fed on or injured the grain. Since the harvest has been
 “ got in, I have found the same insect in the husks of the wild
 “ bearded oats (*avena fatua*), but have not yet seen it in its fly or
 “ perfect state. Should that happen from the *chrysalides* in my
 “ possession, you shall hear from me again.—Amongst the ears of
 “ wheat I found several small black flies (as they appeared to me),
 “ and imagined that they were produced from the above-mentioned
 “ small yellow *chrysalides*; but on consulting our very accurate
 “ friend Dr. Goodenough, he convinced me that this small black
 “ fly was the *Thrips physapus* of Linnæus; and that a small yel-
 “ lowish transparent insect, with 6 legs and 2 antennæ (found
 “ also amongst the wheat), was its *larva* (See tab. 22, fig. 5, 6,
 “ 7, 8).”

Mr. Kirby's communication to me on this subject was in a
 letter dated August 27, 1795, wherein he says—“ You ask me
 “ to make enquiries concerning the insect which has infested
 “ the *wheat* this summer: what follows is the result of those
 “ enquiries, which I hope will give you satisfaction. Before I
 “ had received your letter I had paid some slight attention to the
 “ subject, being informed of the circumstance by some intelligent
 “ neighbours; but your request added a stimulus to my endeavours,
 “ and I flatter myself that the result of my researches will prove
 “ clear and satisfactory. I had from the first suspected the insects
 “ to be the *Thrips physapus*, a species very common every summer,
 “ and, after the closest investigation, my suspicions are turned into
 “ conviction. I examined a great number of ears, and in them
 “ found this insect in all its states, between the *interior valve* of the
 “ *corolla*

“ *corolla* and the grain. It takes its station in the longitudinal fur-
“ row of the seed, in the bottom of which it seems to fix its rostrum;
“ probably sucks the milky juice which swells the grain, and thus
“ by depriving it of *part*, and in some cases perhaps the *whole*, of its
“ moisture, occasions it to shrink up, and become what the farmers
“ in this part of the world call *pungled*. If your correspondent in
“ Hertfordshire means the same insect, he is mistaken in asserting
“ that only a single grain in an ear is injured by it. I have myself
“ seen ears in which a *fourth part* of the grain was destroyed, or
“ materially hurt.—I have frequently seen two of the insects upon
“ a single grain, and am told that sometimes more are observed.
“ What is singular, when I met with them on the grain in the
“ *imago* state, they were often in *pairs*, one of which was *apterous*.
“ These I take to be the sexes. I once found a large species *and*
“ *aculeato* (*Thrips aculeata* Mus. Kirby) in which the same distinc-
“ tion takes place. The *larva* of *Thrips physapus* is yellow, has six
“ legs, which, with the antennæ and head, are black and white.
“ Sometimes it is all yellow. It is very nimble in its motions, and
“ although brought away in the grain, soon makes its escape.—
“ The *pupa* is whitish, with black eyes, and wings apparent. It is
“ very slow and sluggish in its motions. The *imago* it is needless to
“ describe; it is so like itself in every state, that it is impossible to
“ mistake it. There was an orange-coloured powder in every grain
“ in which the insect was found, which I imagine is its excrement.
“ All the farmers that I consulted respecting it agreed in saying
“ that it did most mischief to the *late* sown wheats, and that such
“ as were sown early received little or no injury. This I think very
“ probable; for when the grain is arrived at a certain degree of
“ hardness and consistency (which perhaps was the case with the
“ early sown wheats, before the insect made any material attack),
“ I suppose

“ I suppose it is not liable to be hurt. Linnæus says of this insect,
 “ ‘*Spicas secales inanit,*’ but nobody seems to have apprehended the
 “ injury it is capable of doing to wheat. An intelligent farmer,
 “ who first pointed it out to me, assured me that he was firmly
 “ persuaded that it was this insect which occasioned what was called
 “ the blight last year, which was the cause of so defective a crop.
 “ The part of one field that I examined, and which was particu-
 “ larly injured, was to the north of a high edge; but the above-
 “ mentioned farmer informed me that he had found them plentiful
 “ in a very *open* country. To me they appeared more injurious in
 “ the *heavy* than in the *light* lands. Last year the bearded wheat
 “ (called by our farmers *clog-wheat*) escaped with the least injury;
 “ but this year, as far as my information and observation went,
 “ it was the most injured. I observed in one or two instances
 “ the *Forficula auricularia* upon the ear; and upon examining the
 “ grain, each time, to which it had applied itself, I found upon it
 “ the *Thrips*. Query:—Does it not devour them? Gmelin has a
 “ species of *Thrips* under the name of *Thrips rufa* (*Gmel. Syst. tom. i.*
 “ *pt. 4. Thrips 10.*) from a German writer (*Gleichen, Neuestes im Reiche*
 “ *der Pflanz.*), which I suspect to be the *larva* I have been describing,
 “ or perhaps the *pupa*, which he says ‘*habitat in tritici spicis,*’ and
 “ adds, with a query, ‘*An forsan larva minutissima?*’ The only me-
 “ thod which can be serviceable to prevent the ravages of this
 “ insect is, to sow the wheat early. It is probable that it does con-
 “ siderable damage *every* year, as it is a very common insect. Nor
 “ do I imagine it has been more injurious than usual in the present
 “ year, only the scarcity has excited people’s attention to every
 “ thing that might hurt the grain. I found three other distinct
 “ insects, in the *larva* state, upon the wheat, but in no quantity; two
 “ of which escaped me, but one I had an opportunity of describing.

“ *Larva*

“ *Larva* citron-coloured, without feet, head acute, tail truncated,
 “ margined with a plicato-papillose margin; length three-fourths of
 “ a line. This species I found between the corolla and the grain.—
 “ Of the other two, the one was lodged in the kernel, and the other,
 “ which was a long (about five lines) hexapod, very swift, devoured
 “ it with extreme voraciousness. This is all I have been able to
 “ collect upon this subject; and I wish it may prove satisfactory to
 “ you and the Linnean Society, and serviceable to the public. We
 “ cannot help reflecting, on this occasion, what seemingly small and
 “ insignificant creatures may, in the hand of Divine Providence,
 “ become the causes of the most alarming visitations; and, if allowed
 “ to increase to a certain pitch, almost of the destruction of the hu-
 “ man race.”

From the observations and accurate investigation of my friends above mentioned, it should appear, that very little damage to the wheat is to be dreaded from the havock of the insects they have described. It is, indeed, rather unfortunate that none of us could succeed in breeding the fly, which the small larva, remarked by us all, is destined to produce.—From Mr. Kirby's letter, and the remarks of the farmer, the *Thrips physapus* is the insect that is supposed to do the mischief; and this seems confirmed by the great Linnæus, and also by Gleichen (in a French work on the microscope) quoted by Gmelin, and to such authorities it is with the utmost diffidence I hazard a contrary opinion. I cannot, however, help stating that opinion, being persuaded that the attachment of this minute insect to the grain arises from the grain being first in a diseased state, of which the orange-coloured powder, called by many farmers the *red gum*, seems a proof. For this powder, you informed me, was not the excrement of an insect (as I had supposed), but the farina or seed of a small *Lycoperdon* of Linnæus, or *Æcidium*

of later authors, which attaches itself to decayed leaves, &c. The *Lycoperdon* itself is very minute, and before its bursting has the appearance of a flattish, smooth, irregular, yellow exudation, or gum*. The first step towards putrefaction, either in plants or animals, is a well-known invitation to numerous kinds of insects; and therefore the shrinking of the grain, or the abortion, alluded to by Linnæus when he says *Thrips physapus* "*spicas secales inanit*," may have arisen from some other cause than the depredation of insects.—Gleichen, who was in search of microscopic objects, and consequently turned his attention to the singular and elegant structure of the various parts of minute insects, does not mention that the smallest injury was done to the grain by the *Thrips*, which, he says, "*habitat in tritici spicis*," and he figures several other species found on different flowers. That wheat is not the only plant on which the *Thrips physapus* is to be met with, must be evident to every entomologist; for it is scarcely possible to gather any flower during the whole summer, and even in the spring, without finding it in numbers; particularly the compound flowers of the *Syngenesia* class, such as the *Leontodon Taraxacum*, on which I have always found them in the greatest numbers in their three states. Besides, I am not quite satisfied that this insect, notwithstanding its very minute size, is not carnivorous, as most if not all the *Cimices* and other hemipterous insects are. The minute *larva* of the *Musca* has also that appearance; and, I am in-

* This opinion seems confirmed in a sensible, well-written letter, in the Gentleman's Magazine for August 1795, page 627, signed A. O. O. which I have but very lately seen. The writer's sentiments seem entirely to coincide with mine on this subject.—In the same Magazine and page, another writer, under the signature C. takes notice of the larva of the *Musca*, and the small *Ichneumon* fly, of the former of which he has added a tolerable figure: but although the body of the fly conveys some idea of the animal, yet the antennæ and legs bear no resemblance to any insect. This fly, which he mistakes for the parent of the larva, is most assuredly its enemy, as I have mentioned in the first part of my observations.



clined to think, feeds even on the *Thrips*, which has been one principal reason why we could not breed it.—Mr. Kirby, indeed, mentions that one of two insects which he saw, beside those particularly described, was devoured voraciously by the other, which was a hexapod, and therefore very probably a *Thrips*, or at least an hemipterous insect. The *Forficula auricularia*, which Mr. Kirby also met with on the wheat, I presume, from many observations I had an opportunity of making about two years since, is not carnivorous, having seen it devour various species of culinary plants with great avidity. Its time of feeding is about midnight.

Having communicated to Sir Joseph Banks my thoughts on the subject of these insects, he shewed me, and kindly permitted me to make use of an elegant drawing (See tab. 22. fig. 9—12) which he had directed to be made from some wheat sent him from Yorkshire. This drawing seems to open a new field in the entomological science.

FIG. 9 represents a spicula of the *Triticum hybernum* of its natural size.

FIG. 10 is a flower expanded, and highly magnified.

- A. A cluster of the little larvæ before described, much magnified, that had taken up their residence in the corolla.
- B. The stamina of their usual size.
- C. The styles, ditto.
- D. The germen scarce at all swelled.

FIG. 11. The germen nearly complete, as it appeared in the other flowers of the same ear.

FIG. 12. The larva magnified.

It is curious to observe that the parts of fructification remained unhurt much beyond the usual time; although the fruit was not produced.

XXIV. *Descriptions of Actinia crassicornis and some British Shells.*

By John Adams, Esq. F.L.S.

Read June 7, 1796.

IN addition to the former paper on minute shells, which the Linnean Society did me the honour of receiving, I beg leave to lay before them the result of some observations made since the writing of those remarks.

ACTINIA

- crassicornis.* A. rubra, cirris conico-elongatis. *Syst. Nat. Gmelin.*
3132. *Dicquem, Ph. Tr. vol. lxxiii. t. 16. f. 10. and*
t. 17. f. 11. Baster opusc. subs.
A. fenilis. *Syst. Nat. ed. 12. p. 1088.*

Milford Haven.

Obs. All the specimens I have seen have been of a pale colour, marked with spots of a deep red colour.

TELLINA

- maculata.* T. testa subovata crassiuscula, decussatim striata, maculis irregularibus—*Species nova.*

Tenbigh.

Obs. It is remarkable in this species, that although the figure of the spots in different specimens is

quite dissimilar, yet in both the upper and under shell they are perfectly similar.

VOLUTA

pallida.

V. testa integra oblongo-ovata, spira elevata, columella quadruplicata. *Syst. Nat. Gmel. p. 3444.*

Bulla cylindracea. *Da Costa, Brit. Conch. page 31. p. 2. 1. 7. 7.*

Tenbigh.

Mr. Da Costa is certainly mistaken in considering the shell figured by him as the *Bulla cylindracea* of Mr. Pennant's *Br. Zool. vol. iv. p. 70. f. 85.* The figures above quoted are not indeed accurately finished, but are, nevertheless, sufficiently distinct to shew, that it is the same shell with the figures referred to by Linnæus for his *Voluta pallida*, viz. *Adanf. Sen. t. 5. f. 2. falier*, and particularly *f. 3. simeri*, which accords very accurately with my specimen. His description is, however, very good, and enables me to assert, that it is the true *V. pallida* of Linnæus.

From the *Bulla cylindracea* it differs in the following particulars: 1. In having an evident spire. 2. In its plicated columella. 3. In having a beautiful polish, which the true *B. cylindracea* is entirely devoid of.

TURBO

canaliculatus.

T. quinque anfractibus longitudinaliter canaliculatis, apertura subrotunda.

Minute. Sea-sand. Linny Bay.

Obs. Pel-

Obs. Pellucid, whitish, the spires fluted, and separated by an elevated line.

TURBO*divisus.*

T. quatuor anfractibus, lævibus et striatis; apertura subovali.

Minute. Sea-sand. Linny.

Obs. Colour white, pellucid, each spire divided into two parts. The upper one smooth, the lower one spirally striated.

HELIIX*tomentosus.*

H. testa umbilicata, tribus anfractibus fetosis.

Boggy ground.

Obs. Colour of horn, pellucid, beset with short bristles which give the appearance of downiness. Aperture roundish.

fulgidus.

H. tribus anfractibus apertura, marginata rotunda.

Minute. Sea-sand. Linny.

Obs. Variegated with white and bronze, pellucid, within perlaceous.

SORPULA*fulcata.*

S. duobus anfractibus, profundè spiraliter fulcatis.

On the roots of the *Fucus digitatus*.

Obs. Colour greenish.

XXV. *Botanical Characters of some Plants of the Natural Order of MYRTI.* By James Edward Smith, M.D. F.R.S. P.L.S.

Read October 4, 1796.

THE natural order of MYRTI, *Juss. Gen.* 322, is composed of a number of very elegant shrubs and trees, the *genera* of which have not been clearly defined; nor, indeed, do the limits of this family seem well understood by the best writer on natural orders, M. de Jussieu.

These plants agree in having an arborefcnt stem, the wood of which is generally hard, and of flow growth. Their leaves are simple, for the most part entire, and evergreen; often dotted with clear resinous spots, and almost always more or less aromatic, sometimes astringent. *Calyx* monophyllous, urceolate, or tubular, with several, generally five, teeth, the body of the calyx being permanent, and investing the fruit (in some instances pulpy), though the teeth are very frequently deciduous. *Petals* equal in number to the teeth of the calyx, alternate with them, and inserted into the rim just within them. *Stamina* inserted into the same rim within the petals, numerous, rarely only equal to the petals in number, or about twice as many; for the most part very long, but, in some instances, shorter than the corolla. *Germen* in the bottom of the calyx, simple. *Style* one. *Stigma* undivided. *Fruit* either a berry

berry or capsule, formed of the body of the calyx, or invested with it, consisting of one or more cells, each cell containing one or more seeds. White is the prevailing colour of the flowers. I know no instance of an inclination to blue.

Such is the general idea of the order: there are, however, some exceptions. *Eucalyptus* of L'Heritier, and *Calyptranthes* of Swartz, have no proper petals, but in their stead a simple *operculum*, or cover. *Philadelphus* has a deeply divided style, as well as dentated, deciduous leaves; in *Decumaria*, and *Escallonia* also, the leaves are not entire. This last, and two other genera (*Bæckeia* and *Memecylon*) with which M. de Jussieu was not practically acquainted, he has placed in his preceding order of ONAGRÆ, because they have stamina definite in number, that is, as many, or, at most, twice as many, as the teeth of the calyx. But I am persuaded, if he had seen all these, he would have defined his order of MYRTI so as to admit them, which is ventured upon in the character given above.

It is not my present intention to treat of every genus in this family, nor even to enumerate them all. The difficulty of arranging some beautiful kinds from New South Wales first led me to study the order, and to these I shall principally confine my remarks. They belong to the following 9 genera.

1. *Imbricaria*. *Jungia* of Gærtner.
2. *Bæckeia* of Linnæus.
3. *Leptospermum* of Forster.
4. *Fabricia* of Gærtner.
5. *Metrosideros* of Banks and Gærtner.
6. *Melaleuca* of Linnæus.
7. *Myrtus* of all authors.
8. *Eugenia* of Micheli, Linnæus, and Jussieu.
9. *Eucalyptus* of L'Heritier.

The order in which I have now enumerated them accords, as nearly as can be, with their natural affinity to each other; but they belong to various classes in the artificial system of Linnæus, according to which I shall now give their generic characters.

I. IMBRICARIA.

Jungia. Gærtn. Sem. v. I. 175. t. 35. f. 5.

PENTANDRIA Monogynia, next to *Escallonia*.

CHAR. GEN. *Petala* 5. *Stigma* capitatum. *Capsula* calyce tecta, bilocularis, polysperma.

Gærtner suspected this might not be a distinct genus from the *Escallonia* of Linn. *Suppl.* which he had never seen. But it differs essentially in having a capsule instead of a berry, not to mention many other particulars. See *Plant. Ic. ex Herbario Linnæano, tab. 30 & 31.*

In the unripe germen Gærtner found 2 cells, but of these one is often abortive. This is an instance, among many others, of the propriety of considering the fruit in an early state, when we form generic characters, as the natural number of the parts is often most certainly to be learned in that state. By this rule, the *Linociera* of Schreber will, if I mistake not, be found not distinct from *Chionanthus*.

Gærtner mentions two species of his *Jungia*, of which I have received one from New South Wales—that represented in his plate. In my specimens, the upper leaves, calyx, and petals, are crenate, which he has not expressed, but which is an additional mark of its affinity to *Escallonia*, the leaves of which are more or less serrated;

an unusual circumstance in this natural order. I have also another not mentioned by him.

With respect to the name, there being already a plant of a very distinct genus inscribed to *Fungius* in the *Supplementum Plantarum* of Linnæus, it becomes necessary to give this of Gærtner another denomination. Professor Gmelin has, indeed, called it *Mollia*; but, as I am ignorant of the derivation of that name, I purposely change it. However estimable this writer may be in other branches of science, he can claim no rank as a botanist. The mistakes pointed out by Mr. Dryander in the second volume of our Transactions, and by M. Lamarck in those of the Natural History Society at Paris, are but a small part of his innumerable errors. Perhaps no book in any science contains so many. The zoological part of his *Systema* is far less faulty. In that department he may be considered as authority, till some original author appears; but good-nature would wish to forget his attempts in Botany. I cannot help upon this occasion recommending, that only original authors in Natural History should have any authority to give permanent names. By original authors I mean those who have seen and examined every object which they profess to describe or enumerate, in contradistinction to compilers of the observations or nomenclature of others.

In preference therefore to *Mollia*, this genus is named *Imbricaria*, in allusion to its imbricated foliage. A farther reason for my choice of this name is to abolish the *Imbricaria* of Gmelin, taken up by him from Jussieu, which I know from original specimens to be the identical *Mimusops Kauki* of Linnæus, of which Jussieu, after Commerçon's manuscripts, made a distinct genus on account of its fruit having eight cells, and as many seeds; but Commerçon observed, that four or more of these were often abortive; and, on the other
hand,

hand, Rumphius tells us the *Mimusops* has often as many as three or four perfect seeds. It is probable, therefore, that the germen has eight cells and eight seeds, most of which are generally abortive; another instance of the necessity of studying that part in all its progressive states.

The species of *Imbricaria* are:

1. *IMBRICARIA crenulata*, foliis obovato-cuneiformibus apicem versus crenulatis, petalis calycibusque denticulatis.
Jungia imbricata. *Gærtn. loc. cit.*
2. *I. ciliata*, foliis triquetro-linearibus calycibusque ciliatis, germine pentagono.

To these might be added the *tenella* of Gærtner, which not having sufficiently examined, I for the present omit. All are natives of New Holland, or New South Wales.

2. BÆCKEA Linn.—Juss. Gen. 321.

OCTANDRIA Monogynia, near *Fuchsia* and *Ximenia*.

CHAR. GEN. *Petala* 5. *Calyx* 5-fidus. *Capsula* tri- vel quadri-ocularis, polysperma, calyce tecta.

Jussieu first formed any tolerably just conjectures concerning the natural family of this genus, to which the descriptions of Linnæus and Osbeck by no means lead; nor, indeed, could it have easily been referred to the myrtle tribe, without the increased knowledge of that order which we have derived from the plants of New Holland. There is no doubt, however, that *Bæckea* belongs to the MYRTI, and not to the ONAGRÆ of Jussieu, having the closest

affinity in character, habit, and aromatic qualities, to *Leptospermum*; from which it differs only in having but eight stamina, instead of a large indefinite number, which in this order is a sufficient generic distinction; especially as the number is very constant in all the flowers I have examined of the Chinese, as well as the New Holland, species, though I have not often found two of the stamina (as Linnæus describes them) shorter than the rest.

1. *BÆCKEA frutescens*, foliis oppositis muticis, dentibus calycinis membranaceis coloratis.

B. frutescens. *Linn. Sp. Pl.* 514. *Osbeck. Resa*, 231. t. 1. *Voyage*, v. 2. 373. t. 1.

B. chinensis. *Gærtn. Sem.* 157. t. 31.

Discovered in China by Osbeck.

2. *B. densifolia*, foliis quadrifariam imbricatis obtusis mucronulo reflexo, dentibus calycinis foliaceis.

Sent from Port Jackson, New South Wales, by Mr. White.

3. *LEPTOSPERMUM* *Forst. Gen.* 36. t. 36. fig. f—l. *Juss. Gen.* 323. *Gærtn. Sem.* t. 35.

ICOSANDRIA Monogynia, after *Philadelphus*.

CHAR. GEN. *Calyx* 5-fidus, semisuperus. *Petala* 5, unguiculata, staminibus longiora. *Stigma* capitatum. *Capsula* 4- vel 5-locularis. *Semina* angulosa.

To this genus naturally belong many shrubs which were referred by Dr. Solander to *Philadelphus*, and appeared under that

genus in the *Hortus Kerwensis*. Forster confounded with them, under the name of *Leptospermum*, another most distinct genus, the *Metrosideros* of Banks and Solander. Gærtner first separated all these, and really understood the genus of which we are now treating, though he did not find out its genuine essential character, the capitate stigma, which (as well as the shortness of the stamina) clearly distinguishes it from *Metrosideros*. With *Philadelphus* it has no resemblance in habit, nor scarcely any botanical characters in common. The excellent Dr. Solander would certainly never have referred these plants to that genus, had he examined the common *Philadelphus* itself, which is clearly and strikingly distinguished by its more or less deeply quadrifid style and simple stigmas, without adverting to the broad base of the petals, or the differences pointed out by Gærtner in the fruit. Even Tournefort's figures shew the characters above mentioned, though the style is commonly more deeply divided than he represents it, infomuch that the flowers have often actually four styles. Duhamel describes them so, giving a very incorrect representation of these styles, with capitate stigmas (which ought to be simple), by the side of his copy of Tournefort's figure, to which his has as little resemblance as can well be.

The younger Linnæus and Professor Schreber have confounded *Leptospermum*, as well as *Metrosideros*, with *Melaleuca*, with which the latter of the two only has any great natural affinity. Dr. George Forster has fallen into the same error in his *Prodromus* published in 1786.

The species of *Leptospermum* are much less easy to define than its generic character. Many of them are to be seen in the English gardens, and several have often flowered. The following attempt to characterise such as are distinctly known to me, may serve till we have more light upon the subject; there being several more species

cies in the gardens, which I have not yet seen in sufficient perfection to discriminate them.

1. *LEPTOSPERMUM scoparium*, foliis ovatis mucronatis obsolete trinerviis, calycibus glabris; dentibus membranaceis coloratis.

L. scoparium. Forst. Gen. N. 6.

L. squarrosum. Gærtn. Sem. 174. t. 35.

Melaleuca scoparia. Linn. Suppl. 343. G. Forst. Prod. 37.

Philadelphus scoparius. Ait. Hort. Kew. v. 2. 156.

This is the most commonly cultivated species, and flowers continually. I have received it from the garden of Messrs. Lee and Kennedy, by the name of *Philadelphus floribundus*, along with three other specimens, which I suspect to be varieties of this. They were called *P. rubricaulis*, *P. rubriflorus*, and the "original *P. aromaticus*."

The variety β of *Hort. Kew.* is, according to Sir J. Banks's Herbarium, a very slight one, with shorter and broader leaves. This is, however, the identical *Lept. squarrosum* of Gærtner.

What *P. aromaticus* of *Hort. Kew.* is I have not determined, and must therefore omit it for the present.

2. *L. flavescens*, foliis lineari-lanceolatis obtusis enerviis, calycibus glabris: dentibus membranaceis coloratis nudis.

The flowers appear to be of a fine yellow in the dried specimens. I have not seen this species living.

3. *L. attenuatum*, foliis lanceolato-linearibus acutis trinerviis, calycibus sericeo-villosis: dentibus membranaceis coloratis nudiusculis.

Neither

Neither have I seen this living. The flowers seem to be white, and generally grow two together on short flower-stalks, which are silky like the calyx.

4. *L. lanigerum*, foliis obovato-lanceolatis trinerviis, calycibus sericeo-villosis : dentibus foliaceis persistentibus.

L. trinerve. *White's Voyage*, 229. tab.

Philadelphus laniger. *Ait. Hort. Kew.* v. 2. 156.

Myrtus Amboinensis montana. *Rumph. Amb.* v. 2. t. 18.?

This species varies with smooth and downy leaves, and the calyx is sometimes merely silky, sometimes clothed with long and thick projecting down. Some of its varieties are in the gardens, especially what I take to be the β of *Hort. Kew.* which has small downy twisted leaves, with a little recurved point, and is commonly called *Philadelphus pubescens*. It may be a distinct species.

5. *L. parvifolium*, foliis obovatis enerviis, ramulis calycibusque pilosis : dentibus membranaceis coloratis.

Of this I have only one specimen, nor have I seen it alive ; but it is very distinct.

6. *L. arachnoideum*, foliis subulatis pungentibus, ramulis hirtis, calycibus dentibusque villosis.

L. arachnoides. *Gærtn.* v. 1. 175. t. 35.

I have but a single specimen of this species, which agrees well with Gærtner's figure and original specimen at Sir Joseph Banks's.

7. *L. juniperinum*, foliis lineari-lanceolatis pungentibus, ramulis sericeis, calycibus glabris : dentibus membranaceis coloratis nudis.

This

This is in the gardens, if I mistake not; but I have not seen the flowers fresh. Mr. Fairbairn gave it me by the name of *Phil. diof-mifolius*.

8. *L. baccatum*, foliis lineari-lanceolatis pungentibus, ramulis hirtis, calycibus glabris: dentibus membranaceis coloratis pubescentibus, capsula baccata.

This is a low depressed shrub. The flowers seem to be yellow, and, by the appearance of the dried fruit, it must be very pulpy. I have received from Messrs. Lee and Kennedy a specimen which, for want of the fructification, I scarcely know whether to refer to this or to *L. arachnoideum*, but it rather appears to be that species.

9. *L. ambiguum*, foliis linearibus apice recurvis, calycibus glabriusculis: dentibus foliaceis lanceolatis nudis, staminibus corolla longioribus.

Of all the species I have examined this is the only one that has the stamina longer than the corolla, which is a character of *Metro-sideros*; but as it differs from that genus, and agrees with *Leptospermum*, in the much more important character of the capitate stigma, as well as in habit, I do not hesitate to which to refer it. This species flowered magnificently in the garden of George Hibbert, Esq. F.L.S. this summer. The flowers are white.

All these 9 species I have received from New South Wales.

Perhaps *L. virgatum* of Forster, (*Melaleuca virgata* of Linn. *Suppl.*) ought to be added to the list of known species; but the two specimens in the Linnæan Herbarium, which are all I have seen, are scarcely sufficient to satisfy my doubts. The stamina, as far as I can discover, are regularly ten. If the fruit therefore be unilocular or bilocular, it may be an *Imbricaria*, with a double number of
stamina

stamina to the other species. If the capsules should be found to have 3 or 4 cells, I should incline to reckon it a decandrous *Bæckea*, with which genus its opposite leaves, as well as the size and appearance of the flowers, agree; whereas every *Leptospermum* that I know of, has alternate leaves. It must be left for future consideration.

4. FABRICIA. *Gærtn. Sem. t. 35.*

ICOSANDRIA *Monogynia*, after *Leptospermum*.

CHAR. GEN. *Calyx* 5-fidus, femisuperus. *Petala* 5, fessilia.
Stigma capitatum. *Capsula* multilocularis. *Semina* alata.

Gærtner enumerates two species of *Fabricia*, of which I have received only one, his *lævigata*, from New South Wales, which is also plentiful in the gardens about London, but has never yet flowered. Neither have my specimens any flowers, though they abound with fessile axillary capsules, some of which have the style upon them. The petals being fessile (without *ungues*) is the only part of the generic character which I have borrowed from Gærtner. The numerous cells of the fruit, from 8 to 10, and especially the winged seeds, sufficiently distinguish this genus from *Leptospermum*, to which it is next akin.

The leaves of *F. lævigata* are alternate, obovate, smooth, very obscurely 3 or 5-nerved, of a light glaucous green. The teeth of the calyx are of a triangular figure, whereas in *F. myrtifolia* they are nearly orbicular. This last-mentioned species is also twice as large as the other in all its parts.

5. METROSIDEROS. *Banks. Mss. Gærtn. Sem. t. 34. f. 2.*

Leptospermum. Forst. Gen. 36. t. 36. f. a—e & m—t.

ICOSANDRIA *Monogynia*, after *Fabricia*.

CHAR. GEN. *Calyx* 5-fidus, semisuperus. *Petala* 5. *Stamina* longissima, exserta. *Stigma* simplex. *Capsula* 3 vel 4-locularis.

That this is a most distinct natural genus from *Leptospermum*, as above defined, there can be no doubt, though some great botanists have united them. Sir Joseph Banks, however, and Dr. Solander, were well aware of their difference, and characterized *Metrosideros* by its very long stamina. The stigma being simple and small, not capitate nor depressed, scarcely dilated, I beg leave to propose as a very certain and constant mark of distinction. The habit, moreover, is totally different from *Leptospermum*, and agrees with that of *Melaleuca*; at least this is the case with such species as have alternate leaves, and those with opposite ones have no resemblance to *Leptospermum*.

The petals are concave, nearly sessile, deciduous, generally less coloured than the stamina. The capsule has most generally three valves, and as many cells, rarely four. I believe it might safely be defined *trilocularis* absolutely, but I have mentioned the number four in deference to Gærtner, till I can determine and examine all his species, which are very obscure. His *gummifera* is an *Eucalyptus*, and some of his others are very doubtful. The species of this genus, described as *Melaleucæ* by the younger Linnæus and Dr. G. Forster, are also very much confused, these authors having mutually misunderstood each other so often, and formed their definitions so loosely, that, with most of their original named specimens

before

before me, I can hardly clear up every doubt; nor can I, at present, determine how many of Forster's species are among Gærtner's. The following thirteen are certainly distinct, and all in my herbarium.

* *Foliis oppositis.*

1. *METROSIDEROS hispida*, foliis oppositis basi cordatis amplexicaulibus, ramulis pedunculis calycibusque hispidis.

This is a very magnificent species, easily distinguished by its broad sessile opposite leaves, and hispid branches. The flowers are yellow, with wide-spreading stamina, and grow in umbels, many of which unite to form a large terminal *corymbus*, rough with red-brown hairs, like those of the *Robinia hispida*. Young plants of this *Metrosideros* are to be seen in most collections about London, but none has yet flowered.

2. *M. floribunda*, foliis oppositis petiolatis ovato-lanceolatis, panicula brachiata, pedicellis umbellatis.

The flowers are smaller than those of the last, and appear to be white. The panicles are formed of several branches crossing each other, and terminating in little umbels. Sometimes the flower-stalks are hispid, sometimes smooth.

3. *M. costata*, foliis oppositis petiolatis lineari-lanceolatis acuminatis obliquis, panicula brachiato-decomposita, pedicellis subumbellatis.

M. costata. Gærtner. *Sem.* v. 1. 171. t. 34. f. 2.

This may be known from the preceding by its narrower, longer, more rigid and shining, oblique or falcated leaves. The panicle is more irregularly and repeatedly branched; its utmost ramifications

but imperfectly umbellate. The flowers are much larger, yellowish white. Both kinds are strangers to our gardens.

These three species were found at Port Jackson, New South Wales, by Mr. White.

4. *M. diffusa*, foliis oppositis ovatis venosis utrinque glabris, paniculis axillaribus terminalibusve, pedicellis oppositis.

Melaleuca diffusa. Forst. Prod. 37, ex descr.

————— *lucida*. Linn. Suppl. 342.

Gathered in New Zealand by Messrs. Forster. Of this I have seen only one specimen, which was given to Linnæus by Dr. Sparrman for the *Leptospermum collinum* of Forster. It is, however, totally different from other specimens in the Linnæan Herbarium from Forster himself, marked *collinum*; and which perfectly answer to the description. This can be no other than the *Melaleuca diffusa* of Forster's *Prodromus*.

5. *M. villosa*, foliis oppositis ovatis venosis subtus pubescentibus, thyrsis axillaribus terminalibusve oppositis villosis, floribus sessilibus confertis.

Melaleuca villosa. Linn. Suppl. 342.

————— *æstuosa*. Forst. Prod. 38.

Leptospermum collinum. Forst. Gen. N. 2.

Metrosideros spectabilis. Gärtn. Sem. v. 1. 172. t. 34. f. 9. ?

A native of *O-Tabeiti*. We have it not in the gardens.

The stem is much branched. Young branches and backs of the younger leaves downy; the flower-stalks, bractæ, and calyx, very much so. Flowers red, very ornamental, standing at the end of each branch in a pair of small dense panicles or *thyrsi*, which are truly

truly axillary and opposite, though the branch, terminating abruptly, is not protruded beyond them.

6. *M. florida*, foliis oppositis obovato-oblongis venosis glabris, thyrsis terminali, calycibus turbinatis nudis.

Melaleuca florida. Forst. Prod. 37.

Leptospermum scandens. Forst. Gen. N. I.

A native of New Zealand, not yet introduced into our gardens.

The branches are long, each terminated by a *thyrsus* of large yellowish flowers, whose calyx is remarkably lengthened out, almost as in the clove. The leaves are smooth. The flower-stalks and calyx scarcely perceptibly silky, with close-pressed hairs.

7. *M. glomulifera*, foliis oppositis ovatis reticulato-venosis subtus pubescentibus, capitulis lateralibus pedunculatis bracteisque tomentosis.

Gathered near Port Jackson by Mr. David Burton. It is a tree, with round opposite branches. Leaves opposite, on shortish downy footstalks, ovate, entire, a little waved, reticulated with numerous veins, clothed with short soft down on the under side. Flowers greenish yellow, clustered in little globular heads, which stand on simple downy foot-stalks about an inch long, growing laterally, (mostly opposite to each other) just above the insertion of the uppermost leaf-stalks and contrary to them. Each head of flowers is accompanied by a pair of oblong downy bractæ, and the calyx is also downy.

This species is but slightly aromatic. It is said to be very rare.

8. *M. angustifolia*, foliis oppositis lineari-lanceolatis nudis, pedunculis axillaribus umbellatis, bracteis lanceolatis glabris deciduis.

Myrtus angustifolia. *Linn. Mant.* I. 74.

A native of the Cape of Good Hope. The original specimen in the Linnæan Herbarium was sent by Professor Schreber, and, having no fruit, might easily be mistaken for a *Myrtus*. Linnæus afterwards received another specimen from Professor Thunberg, laden with ripe capsules in the lower part of the branches, and budding flowers above. This he did not perceive to be his *Myrtus angustifolia*, but, on examination of the capsules, determined it a *Leptospermum* (which it is, as that genus stands in its first author Forster), and wrote that name on the back of the paper not long before his death, as appears by the hand-writing. His son and successor, less cautious, placed this same specimen in the herbarium, writing upon it *Myrtus angustifolia*, without any remark. I find it upon examination a true *Metrosideros*. The stamina are distinct, thrice as long as the petals, and twice as long as the style, which has a perfectly simple stigma. Calyx-teeth deciduous.

The ripe capsules precisely resemble those in Gærtner's figure of *Melaleuca suaveolens*, but that is, in other respects, a very different plant.

Burman's synonym (*Flo. Afr.* 237. t. 83. f. 2.), quoted by Linnæus, can hardly belong to this plant, unless his description be very bad; for he calls the fruit a black berry, with one cell and a single seed.

The dried leaves of this species are tinged with the same metallic green that is observable in those of *Metrosideros hispida*, and some other New Holland plants of this order.

* * *Foliis alternis.*

9. *M. ciliata*, foliis sparsis sub-oppositis ellipticis obtusis coriaceis basi subciliatis, corymbis terminalibus pilosis.

Melaleuca ciliata. Forst. Prod. 38.

Leptosmerrum ciliatum. Forst. Gen. N. 3.

Gathered by Messrs. Forster in New South Wales? (*Nova Caledonia*). Not yet introduced into the English gardens.

The leaves are remarkably rigid, thick, and concave, their margin reflexed, like those of *Celastrus lucidus*, but less shining; whitish, and reticulated with transverse veins beneath, and marked with a straight central nerve. It is extraordinary that Dr. Forster characterizes them as without nerve or veins. Those parts may perhaps be less visible in recent specimens. The base of most of the leaves is ciliated with long spreading hairs, like those on the young branches, flower-stalks, calyx, and even petals. The flowers are large, handsome, deep-red, but few together, in a terminal corymbus or umbel. Fruit large, depressed, projecting in three lobes much above the rim of the calyx.

10. *M. linearis*, foliis sparsis linearibus canaliculatis acutis rigidibus, floribus lateralibus confertis sessilibus.

Melaleuca linearis. Schrader Sert. Hannoveran. 19. t. II.

This is not uncommon in the English collections, but has not yet flowered here, though it has at Hanover. The leaves are very long, narrow, somewhat pungent, rigid, and harsh. There is a variety with semicylindrical leaves, more rough on the back than the more common kind. The flowers surround the branches in a
long

long cylindrical sessile cluster. Their petals are green, often slightly downy; stamina very long, crimson. Capsules round, depressed, when old crowding each other into an angular form.

11. *M. lanceolata*, foliis alternis lanceolatis mucronatis, floribus lateralibus confertis sessilibus pubescentibus.

M. citrina. *Curt. Mag. t. 260.*

A beautiful shrub, now very common in every greenhouse, which first flowered several years ago at the Marchioness of Rockingham's, but not in perfection; neither does Mr. Curtis's figure give a good idea of the natural situation of its blossoms, which very nearly resemble those of the preceding.

It is totally unaccountable to me how this plant came by the name of *citrina*, there being nothing about it approaching to a lemon-colour, except the pollen, which would hardly have occasioned such a denomination. Sometimes I have imagined it might allude to a resemblance in the appearance or smell of the leaves to a lemon tree, which however does not exist; and if it did, the name ought to have been *citrea*. I would never change a name that has been generally in use, whether published or not; but this is too preposterous to be retained.

12. *M. saligna*, foliis alternis lanceolatis utrinque attenuatis mucronatis, floribus lateralibus confertis sessilibus glabris.

This is distinguished from the preceding by its tapering less rigid leaves, smaller yellowish flowers, the calyx and petals of which are quite smooth in all their parts, neither downy nor fringed. It is not in the gardens. I had a suspicion this might be the *M. viminalis* of Gærtner; but the original specimens of that species at Sir Joseph

Joseph Banks's are very different, having linear-lanceolate leaves, not tapering at the ends, and downy flowers.

Rumphius's *tab. 17. f. 2. vol. 2*, has some resemblance to this plant, but he describes his as very aromatic, which ours is not at all.

13. *M. capitata*, foliis sparsis obovatis mucronulatis, capitulis terminalibus, calycibus ramulisque pilosis.

This differs widely in appearance from all the other species.

The leaves are scarcely one-third of an inch in length, very slightly veined, obsoletely crenate, or rather rough in the margin with minute points. Flowers on short flower-stalks, in little terminal heads. Calyx tubular, very hairy, with foliaceous permanent teeth. Petals small, purple. Stamina of the same colour, and about thrice as long as the corolla. Germen very small, in the bottom of the calyx. Style equal to the stamina; the stigma a little enlarged, but not capitate.

I have not seen the fruit in any degree of maturity, but there can be no doubt of its being that of a *Metrosideros*, as I have detected the rudiments of three small valves. The form of the flower is much like the *Lythrum* tribe. The leaves are punctate, though scarcely aromatic.

This is not, to my knowledge, in the gardens. I am indebted to Mr. White for specimens of it, and the three preceding, from New South Wales.

6. MELALEUCA Linn.—Gærtn. Sem. t. 35. Juss. Gen. 323.

POLYADELPHIA Polyandria.

CHAR. GEN. Calyx 5-fidus, semisuperus. Petala 5. Filamenta
VOL. III. N n multa,

multa, longissima, connata in 5 corpora. Stylus 1. Capsula 3-locularis.

Perhaps this genus is not naturally distinct from the last, the union of the filaments being all that distinguishes *Melaleuca*; for in the rest of the fructification, as well as in habit, they agree. Accordingly the younger Linnæus, the two Forsters, and Schreber unite them into one, and Jussieu seems inclined to do so. Unfortunately these great authorities fall to the ground, and their opinion can by no means be considered as of any weight in this case, as we find them confounding with the above the true genus of *Leptospermum*, than which nothing can be more distinct, in every circumstance that characterizes a natural or artificial genus. Gærtner, so little attentive in general to any thing but the fruit, preserves all the three separate; though several of his species of *Metrosideros*, which he knew only in fruit, prove to be *Melaleucæ*.

The following eleven very distinct species of *Melaleuca* I have examined in flower, and am therefore certain of their genus.

* *Foliis alternis.*

MELALEUCA *Leucadendron*, foliis alternis lanceolatis acuminatis falcato-obliquis quinquenerviis, ramulis petiolisque glabris.

M. *Leucadendron*. *Linn. Mant.* 1. 105. *Suppl.* 342 a.

Arbor alba. *Rumph. Amb.* v. 2. 72. t. 16.

This tree is a native of some parts of the East Indies, and from it is distilled the green aromatic oil called *Cajeput*, from *Caju Puti*, a white tree, the Malay name of the plant; hence Linnæus gave the name of *Leucadendron* to this species.

2. M. *viri-*

2. *M. viridiflora*, foliis alternis elliptico-lanceolatis coriaceis quinquenerviis, ramulis petiolisque pubescentibus.

M. viridiflora. Gærtn. Sem. v. 1. 173. t. 35.

M. Leucadendron β. Linn. Suppl. 342.

Unquestionably a very distinct species from the preceding, with which the younger Linnæus confounded it. The leaves are much more thick and rigid, straight, not falcated, nor so much pointed, of a lighter colour, with generally five, but sometimes seven nerves. The footstalks and younger branches are downy, which is not the case in *M. Leucadendron*.

This grows in New South Wales. The flowers are pale yellowish green.

3. *M. laurina*, foliis alternis obovato-lanceolatis uninerviis, pedunculis axillaribus dichotomis pubescentibus.

Specimens of this were brought to Sir Joseph Banks from New South Wales by Governor Philip. It is nearly allied to *Melaleuca suaveolens* of Gærtner, tab. 35, with which its inflorescence and fructification almost entirely agree, but the leaves of that are much broader and elliptical. Those of *M. laurina* have a great resemblance to the *Daphne laureola*. Neither is this species at all aromatic, which the other should seem by its name to be. *M. suaveolens* comes from the hotter parts of New Holland, near Endeavour river.

4. *M. stypheloides*, foliis alternis ovatis mucronato-pungentibus multinerviis, floribus lateralibus, dentibus calycinis striatis mucronatis.

Gathered near Port Jackson by Mr. David Burton. It has alto-

gether the habit of a *styphelia*. The leaves are thick-set, twisted, harsh, pungent and striated, exactly as in several of that genus, and very slightly aromatic, so that it could hardly be taken for one of the *Myrti*, except by the fructification.—The flowers are white, surrounding the lower part of the youngest branches in very short clusters. Calyx downy, with erect, rigid, spinous, striated, permanent teeth. Petals smooth, membranous. Stamina twice as long as the calyx.

5. *M. ericifolia*, foliis sparsis oppositifve linearibus enerviis subrecurvis muticis, floribus lateralibus apicem versus ramulorum confertis.

The dried leaves of this species taste strongly of coriander seeds. I have not seen it growing. Its flowers are white, growing in short clusters round the branches, as in the following, but not quite so near the top. Its leaves differ widely from that species, being much smaller, not pungent nor rigid, but a little recurved. The young bark is of a silvery white. I have not seen the fruit.

6. *M. nodosa*, foliis sparsis linearibus mucronato-pungentibus rectis, floribus apicem versus ramulorum glomeratis.

Metrosideros nodosa. *Gærtn. Sem. v. 1. 172. t. 34. f. 6.*

The leaves are numerous, scarcely an inch long, very narrow, though broader than those of *M. ericifolia*, stiff, and sharp pointed. Flowers small, whitish, clustered round the tops of the youngest branches, so as to appear like little *capitula*; but after flowering the branch is protruded beyond them, and the ripening capsules remain investing it in an annular manner. The figure of Gærtner represents them in their most advanced state, apparently bleached by exposure

exposure to the air. I have consulted his specimens, and find no reason to doubt their being the same as mine.

7. *M. armillaris*, foliis sparsis linearibus mucronatis apice recurvis, floribus lateralibus, filamentis longissimis linearibus apice radiato-multifidis.

Metrosideros armillaris. *Gærtn. Sem. v. I. 171. t. 34. f. 5.*

This has much the habit of a *Diosma*, in the leaves especially, which, in a garden specimen with which I was favoured from Mr. Robertson's at Stockwell, are very distinctly marked with a row of resinous spots on each side the mid-rib at the back, but these are less visible in the wild plant. The flowers are white, clustered about the lower part of the branches, in the form of a long spike. The footstalk or claw of the united filaments is very long before it branches off, even thrice the length of the petals.

8. *M. genistifolia*, foliis sparsis lanceolatis mucronatis trinerviis multipunctatis, ramulis floriferis terminalibus laxis, filamentis apice radiato-multifidis.

Sent from Port Jackson by Mr. David Burton. It is in some respects like *M. nodosa*, but the leaves are lanceolate rather than linear, not above half so long as in that species, nor so rigid and pungent. The branches terminate in loose spikes, from the top of which the branch is at length continued, as in the other species. The flowers are sessile, in alternate pairs, white. Claw of the stamina twice as long as the petals before the filaments branch off.

* * Foliis oppositis.

9. *M. linariifolia*, foliis oppositis lineari-lanceolatis trinerviis subtus multipunctatis, ramulis floriferis terminalibus laxis, filamentis pinnatis.

This, we are told by Mr. White, is a large tree, the bark of which is very thick and spongy, serving the purpose of tinder. The branches are clothed with tapering glaucous leaves, thrice as long as in the last species, and from the summits spring several young branches, set with a series of opposite sessile solitary white flowers, (not, as in that, in pairs ranged alternately), beyond which the branch is soon protruded. The most essential character however of this species consists in the filaments, which are very long, being pinnated, or ranged with stamina on each side, more or less regularly, from near the base to the summit. The leaves have a nutmeg-like flavour.

10. *M. thymifolia*, foliis oppositis elliptico-lanceolatis enerviis, ramulis floriferis lateralibus brevissimis paucifloris, filamentis medium usque ramosis.

Mr. Fairbairn has presented flowering specimens of this species to the Linnæan Society from Chelsea garden. The flowers are purple, ranged along the branches of a year or two old, in little short opposite spikes; which however soon prove to be real branches by the leaves shooting out at their ends, this lateral mode of inflorescence being common to almost the whole genus, *M. laurina* and *suaveolens* only having axillary branching flower-stalks, nor have I yet seen a *Melaleuca* with terminal flowers.

The

The teeth of the calyx in *M. thymifolia* are permanent, and the whole of that part, as well as the back of the leaves, abounds with a fragrant essential oil, lodged in pellucid prominent dots.

II. *M. hypericifolia*, foliis oppositis elliptico-oblongis uninerviis, floribus confertis, filamentis longissimis linearibus apice radiato-multifidis.

The most beautiful of the genus. It grows in swampy ground, and is found like all I have now described, except the first species, in New South Wales. *M. hypericifolia* is plentiful in the English gardens, and was generally taken for an *Hypericum*, till it lately produced, in several collections near London, its elegant flowers. These grow in a cylindrical form round the branches, and have some resemblance to those of my *Metrosideros lanceolata* (commonly called *citrina*), occasioned by the radiated crimson filaments projecting in every direction. The claws of those filaments are very long, linear, and of a dull yellowish hue like the petals.

7. MYRTUS Linn.—Gærtn. Sem. t. 38. Juss. Gen. 324.

ICOSANDRIA Monogynia.

CHAR. GEN. Calyx 5-fidus, superus. Petala 5. Bacca bivel tri-ocularis. Semina plurima, gibba.

Few genera are more confused in the works of Linnæus than *Myrtus*. The above characters will serve to define all that properly belong to this genus, of which I have received from New South Wales the following two species only.

1. *MYRTUS tenuifolia*, pedunculis axillaribus solitariis unifloris, foliis linearibus mucronulatis.

An elegant little shrub which has not yet appeared in the gardens. The leaves are opposite, somewhat more than an inch in length, and about a line in breadth, slightly revolute, downy beneath. Flower-stalks filky, shorter than the leaves, each bearing a small white flower, often tinged externally with red, and not unlike the common myrtle blossom, though scarcely half so large. The germen is very filky. Calyx nearly smooth. Petals downy. The ripe fruit I have not seen, but from an examination of the germen, and every part of the flower, I think there can be no doubt of the genus.

2. *M. trinervia*, pedunculis axillaribus trifloris, foliis ovatis acuminatis trinerviis subtus tomentosis.

This is also a stranger to our gardens. The leaves are large and handsome, opposite, ovate pointed, downy beneath, with three strong nerves, as in those of *Blakea*. Flowers small, generally three together, on short, hairy, forked, axillary flower-stalks. Although the teeth of the calyx, and the petals also, are generally but four, it is a true *Myrtus*, and not an *Eugenia*, the fruit being a berry with many shining gibbous curved seeds. It has but one cell when ripe, but the germen appears to be divided into two or three cells.

8. *EUGENIA* Linn.—*Juss. Gen.* 324.

Syzygium. *Gærtn. vol. 1. 166. t. 33. f. 1.*

CHAR. GEN. *Calyx* 4-fidus, superus. *Petala* 4. *Bacca* unilocularis, monosperma.

1. *EUGENIA*

- I. *EUGENIA elliptica*, foliis ellipticis acuminatis, floribus paniculatis, calyce repando, bacca globosa.

A tree or shrub of New South Wales, with round dichotomous leafy branches. The leaves are opposite, on short foot-stalks, elliptical, pointed at both ends, entire, a little revolute, smooth, with one rib and many parallel side veins. Panicles about the summits of the branches, axillary and terminal, erect, consisting of numerous, opposite, smooth, branched and forked stalks, without *bractea*. Flowers small. Calyx clavate, its margin waved, but not toothed. Petals four, white, very minute and fugacious. Stamina numerous. Style short, with a simple stigma. Berry the size of a large pea, globular, white, crowned with the calyx, and consisting of a thick pulpy coat, investing a solitary seed. The leaves are full of resinous spots, and the calyx abounds with a fragrant essential oil.

No plant in the order has given me so much trouble, to determine its genus, as this. It undoubtedly belongs to the *Syzygium* of Gærtner, *tab.* 33, which is to be distinguished from *Eugenia* only by having a *bacca* with a single seed, instead of a *drupa*. Gærtner indeed has not told us exactly what he understood by *Eugenia*, nor has he figured any thing under that name; but I presume he meant either the original *Eugenia uniflora* of Micheli, or the *E. Iambos*. I have examined ripe fruits of both these, and the young germen of the former of them, which has two cells, with the rudiments of a seed in each. When the fruit is ripe, it in both species consists of one large seed, clothed with a very thin shell or skin, without any fissure or seam, and the whole enveloped in a firm fleshy pulp. In my *Eugenia elliptica* just described, the pulp is immediately attached to the seed itself, as Gærtner describes his *Syzygium*. I think however with Jussieu, that the two genera may be safely united; for we

find another circumstance, mentioned by Gærtner as discriminating them, the two cells in the germen of *Syzygium*, does not hold good, being also to be found in *Eugenia*. I beg leave here to consider as the true *Eugenia* that which Micheli first called so, and which stands in the latter editions of Linnæus in three different places, being his *Eugenia uniflora*, *Myrtus brasiliensis*, and *Plinia pedunculata*, and there is no doubt of its according exactly in generic characters with *Eugenia Iambos*. What really constitutes the genus of *Plinia* is very doubtful, Plumier's figures, and the descriptions of other authors taken from them, being a mass of inextricable confusion; but if these figures mean any thing, they cannot accord with our *Eugenia*, nor indeed do they resemble it, except in the pulpy fruit being furrowed, somewhat (but not exactly) like that of *Eugenia uniflora*. I am aware however that the opinion of Linnæus in the *Supplementum Plantarum* is here against me, as well as that of my accurate friend Mr. Dryander in the *Hortus Kewensis*. If Plumier's original species of *Plinia* should ever be found, it will remove the doubt. In the mean time, one of the few points of which we are certain is, that if the common *Eugenia uniflora* be not a *Plinia*, it must constitute the real genus of *Eugenia*, whatever the other plants may be that are now arranged under that name; and if it be a *Plinia*, *Eugenia Iambos* is one likewise.

9. EUCALYPTUS. *L'Heritier Sert. Angl. t. 20. Ait. Hort. Kew. v. 2. 157. Bot. of New Holl. t. 13.*

CHAR. GEN. *Calyx* superus, persistens, truncatus, ante anthesin tectus *operculo* integerrimo, deciduo. *Corolla* nulla. *Capsula* quadrilocularis, apice dehiscens, polysperma.

There

There is not a more natural genus in the whole Linnæan system than this. It is clearly characterized at first sight by the singular *operculum* which closes the calyx, and covers up the stamina and style till they arrive at maturity. In this respect it agrees with the *Calyptranthes* of Dr. Swartz, but differs from that genus in having a capsule, not a berry.

All the species of *Eucalyptus* hitherto discovered come from New Holland. Gærtner being unacquainted with the peculiar structure of their flower, confounded some of them with *Metrosideros*. They agree so much with one another in habit and leaves, as to be impossible to discriminate, except by their inflorescence, and the form of their *opercula*. I have already characterized some of them in the *Botany of New Holland*, p. 39 to 44; but having since become acquainted with many more, it is necessary to revise the whole, and contrast their specific characters.

The leaves of all are entire, lanceolate, rarely ovate, more or less oblique or unequal at the base; flowers either in umbels or *capitula*; the former of which are either solitary or paniced, lateral or terminal; the latter always solitary and lateral. The genus is conveniently divided into two sections, in one of which the cover of the flower is conical, in the other hemispherical.

* *Operculo conico.*

- I. *EUCALYPTUS robusta*, operculo conico medio constricto calyce latiori, umbellis lateralibus terminalibusque, foliis ovatis.

E. robusta. *Bot. of New Holland*, 40. t. 13.

This is called the brown gum tree, or New Holland Mahogany, its wood being red, hard and heavy, in some degree answering the

purposes of the West Indian mahogany. Its leaves are broader than in any other species that has come to my knowledge, and the flowers larger, except only those of *E. corymbosa*.

2. *E. pilularis*, operculo conico medio constricto longitudine calycis, umbellis lateralibus, fructu globofo, foliis linearilanceolatis.

The leaves are much narrower than in the preceding, and the flowers not half so large; neither is their cover, as in that, more in diameter than the calyx. The fruit is globose. I suspect that of *E. robusta* to be turbinate with a reflexed margin, but I have seen it only half ripe.

3. *E. tereticornis*, operculo conico tereti lævissimo membranaceo calyce latiori triploque longiore, umbellis lateralibus solitariis.

E. tereticornis. *Bot. of New Holland*, 41.

Remarkable for its long, very smooth, membranous *operculum*, which bursts just above the base, leaving the lower part like a ring sticking for some time to the calyx. The leaves are lanceolate and oblique.

4. *E. resinifera*, operculo conico tereti coriaceo calyce duplo longiori, umbellis lateralibus solitariis.

E. resinifera. *White's Voyage*, 231. *tab.*

Metrosideros gummifera. *Gærtn. Sem. v. 1. 170. t. 34. f. 1.*

At first sight this nearly resembles the last; but on accurate examination the *operculum* is found only twice the length of the calyx, and

and barely of the same diameter with it, not broader. It is moreover not so smooth, nor of the membranous texture of the *tereticornis*, but thick and leathery as in the other species, separating entirely from the base.

FIG. g in Mr. White's plate we now know to be a diseased flower, not an impregnated one.

5. *E. capitellata*, operculo conico obtusiusculo calyceque anguloso subancipiti, capitulis lateralibus solitariis, fructu globoso, foliis ovato-lanceolatis.

E. capitellata. *Bot. of New Holland*, 42.

Fruit, *White's Voy.* 226. tab. fig. a.

This essentially differs from all the preceding, in bearing its flowers in *capitula*, or little heads, (that is, without partial flower-stalks, instead of umbels. The cover is not more than equal to the calyx in length, angular like that part, and compressed at the summit. The leaves ovato-lanceolate, rigid, oblique.

6. *E. saligna*, operculo conico acuto calyceque anguloso subancipiti, capitulis lateralibus solitariis, fructu turbinato, foliis lineari-lanceolatis.

The leaves are narrower and less coriaceous than in most of the species. The little heads of flowers grow on shortish flower-stalks, one from the bosom of each leaf. The flowers are smaller than in any of the others. Their covers acute, the length of the calyx. Fruit turbinate with a slightly recurved margin, and crowned with the pyramidal permanent base of the style.

* * Operculo hemisphærico.

7. *E. botryoides*, operculo hemisphærico submutico, capitulis lateralibus solitariis, pedunculis cuneatis compressis, fructu turbinato.

This, like the two preceding, bears its flowers in solitary *capitula*, but is distinguished from them by its broad hemispherical *opercula*, with scarcely any point at their summit, which, from the clustering together of the flowers, look like bunches of some kind of berries. The common flower-stalks are flat, and very broad, especially at the top. The leaves lanceolate, oblique.

8. *E. hæmastoma*, operculo hemisphærico depresso mucronulato, umbellis lateralibus terminalibusque; pedunculis compressis, ramulis angulatis, fructu subglobofo.

The leaves are coriaceous, lanceolate, terminating in a long linear point. Flowers in umbels, not *capitula*, their covers depressed at the top, but suddenly terminating in a little point. Fruit globose, cut off at the summit, its orifice surrounded by a broad deep-red border. This species has a great affinity with the *Leptospermum umbellatum* of Gærtner, but I dare not assert it to be the same.

9. *E. piperita*, operculo hemisphærico mucronulato, umbellis lateralibus subpaniculatis solitariisve; pedunculis compressis, ramulis angulatis.

E. piperita. *White's Voyage*, 226. tab. leaves only. *Bot. of New Holland*, 42.

Very distinct and different in appearance from the last, though
their

their specific characters are very similar. The leaves of *E. piperita* are nearly ovate, though oblique. Flowers smaller than those of the preceding, and situated all in great numbers about the lower part of the branches, not near the top, a few of the umbels only being solitary, the rest uniting to form several panicles or *corymbi*.

10. *E. obliqua*, operculo hemisphærico mucronulato, umbellis lateralibus solitariis; pedunculis ramulisque teretibus.

E. obliqua. *Ait. Hort. Kew. v. 2. 157. L'Herit. Sert. t. 20. Bot. of New Holland, 43.*

A native of the warmer parts of New Holland. It is the only species here described which we have not received from Port Jackson. The round branches and flower-stalks distinguish it from the last, to which it is most nearly allied.

11. *E. corymbosa*, operculo hemisphærico mucronulato, calyce tereti, umbellis corymboso-paniculatis terminalibus.

E. corymbosa. *Bot. of New Holland, 43.*

The flowers are large and handsome, forming magnificent terminal paniced clusters of umbels, by which this species is readily distinguished. Leaves lanceolate, coriaceous. Fruit turbinate, the permanent calyx forming a very high urceolate border, the style remaining in the centre of the cavity.

A fine plant of this kind is in the collection of Messrs. Lee and Kennedy, but has not yet flowered.

12. *E. paniculata*, operculo hemisphærico submutico, calyce anguloso, umbellis subpaniculatis terminalibus.

This differs from the last in its angular calyx and less pointed
5
operculum,

operculum, as well as in being smaller in all its parts. The umbels do not form so considerable a compound cluster or *corymbus*, but are collected about the tops of the branches into a small panicle, the lowermost of them being axillary.

My specimens were gathered at Port Jackson by Mr. David Burton, and I received them from Sir Joseph Banks's herbarium.

Of all these twelve species of *Eucalyptus*, I am not certain of any more being in the gardens than the *corymbosa*, *obliqua*, and *piperita*. The latter is very common, and may be known by its smell, resembling that of peppermint.—There are however several New Holland shrubs in the collections about London, which I suspect to belong to the same genus; but having never seen their fructification, I cannot ascertain them.

XXVI. *Observations on the Genus OESTRUS.* By Mr. Bracy Clark,
Veterinary Surgeon, and F.L.S.

Read November 1, 1796.

THE following account of the *Oestri* was collected from observations, which were made during a few months residence in a country particularly favourable for remarks of this nature; and though a small part of their history still remains unknown, these observations may perhaps be acceptable to the Linnean Society, from the additional information they contain concerning this genus, and from the correction of some material errors which are, at present, generally admitted as truths by naturalists.

The pain the *Oestri* inflict on the animals that are subject to them particularly entitles them to our notice, and more especially as those are unfortunately the useful and the domesticated. By their continual attacks, these small yet formidable enemies interrupt the few moments of repose and enjoyment allowed to these useful slaves during the summer months. Nor does the punishment end here: the *larvæ*, by remaining with them, are frequently supposed the cause of their disease, and even death. These circumstances render the investigation of their natural history an object of some importance; and the extraordinary means they pursue in depositing their eggs, the situations the *larvæ* inhabit, and the very high temperature to which they are exposed, render their history interesting from its singularity.

If the present investigation should prove acceptable to the scientific naturalist, from the species being exhibited with greater perspicuity than they have hitherto been; it is also hoped the description of their economy and manners will render it not less so to the enlightened veterinarian, as tending to point out the most effectual means of removing them when they become the source of disease.

The obscure situation of the *Oestri* in their *larva* state has been a principal cause of their history being less understood than that of other insects; and in some instances the defective parts have been supplied from imperfect observation, or mere conjecture; as the *Œ. hæmorrhoidalis* is said to deposit its eggs "*mirè per anum intrans,*" which, though perfectly fabulous, has by frequent repetition on such high authority*, obtained the appearance of an established truth; and from the silence of authors on the subject, it appears that the mode in which the other species deposit their *ova* has not been at all understood.

Since the time of Linnæus the errors of this genus, far from being expunged, have considerably accumulated by the confusion of the species with one another; which in part may be attributed to inattention, but chiefly perhaps to the difficulty of procuring specimens for examination. The inaccessible situations of the *larvæ*, and the impossibility of successfully imitating by artificial means their mode of life when removed, have rendered them scarce; and in their fly state they are not often seen, or easily taken. This difficulty will be in a considerable degree removed, when their history and the most proper time of obtaining them is pointed out.

The errors will be best corrected by means of a plate, representing

* *Linnaei Systema Natura*, p. 969. This error appears to have originated with Reaumur, who received it from a Dr. Gaspari. See note on *Œ. hæmorrhoidalis*.

all the species in one view in their various states, taken from the subjects themselves; and this will be the more useful and necessary, as hardly any of the *larvæ*, or perfect insects, have ever yet been intelligibly figured.

The obscure and singular habitations of the British *Oestri* are the stomach and intestines of the horse, the frontal and maxillary sinuses of the sheep, and beneath the skin of the backs of horned cattle. In other parts of the world they inhabit various other animals; but our present enquiry is necessarily limited to those of our own country, which includes all those about which any difficulty or obscurity has arisen.

Of the OESTRUS Bovis.

THIS rare species has been entirely omitted by Linnæus, and appears to have been unknown to nearly all the later writers on Natural History, who, instead of the true *Æ. Bovis*, have described a species peculiar to the horse under that name. Linnæus imagined also that it was the same species which inhabited both the stomachs of horses and the backs of oxen *, which certainly never happens.

The *larva*, tab. 23, fig. 1, taken from the back of the cow, is so unlike the other *larvæ* of this genus, that I did not imagine, till I procured the fly from it, that it was the *larva* of an *Oestrus*. It does not possess the *aculei*, the marginal *setæ*, or the lips, which are the prominent characters of the *larvæ* of the *Æ. Equi* and *hæmorrhoidalis*.

It lives beneath the skin, being situated between it and the cellular membrane, in a proper sack or abscess, which is rather larger than the insect, and by narrowing upwards opens externally to the air by a small aperture.

* Habitat in ventriculo equorum, in boum dorso. *Linn. Syst. Nat.* 2. p. 969. *ed. duodecima.*

When young the *larva* is smooth, white, and transparent: as it enlarges it becomes browner, and about the time it is full grown it is totally of a deep-brown colour, having numerous dots on its surface, disposed in transverse interrupted lines, passing round the segments. Two distinct and different kinds of lines are seen on each segment: the uppermost of them is narrower, and consists of larger dots. Underneath this is a broader line, and the dots considerably smaller. The first are easily seen, by using the lens, to be hooks bent upwards, or towards the tail of the insect. See fig. 1, a.

On examining the broader line of small dots (fig. 1, b) with a tolerably powerful magnifier, they are also found to be hooks, but turned in an opposite direction, that is, downwards in the abscess, and towards the head of the insect.

These hooks, it is probable, are occasionally erected by the muscles of the skin, and according to the series of them used by the *larva*, it is raised or depressed in the abscess; and by this motion, and the consequent irritation, a more or less copious secretion of pus is occasioned for the sustenance of the *larva*.

This singular arrangement of hooks round the body of the *larva*, in this instance serves the same purpose as the legs in other *larvæ*, enabling it to move about in the abscess, and to crawl out of it when ripe, and renders the use of the *tentacula* observable in the other species not necessary in this.

Beside these on the surface of the skin, there are a number of rounded unarmed prominent points, which have a minute depression in the centre, and appear to be the *spiracula*, being the external opening of the extreme branches of the air tubes.

In what manner the pus is received by the *larva* for nourishment is not immediately discoverable. In the upper part of the *larva*, or that end which is applied to the external opening in the skin, may
be

be observed two small horny plates, which are found on dissection to close the extremities of the trunks of some large air vessels. Near to these plates, and somewhat above them, a minute puncture is discernible by the assistance of a microscope, which was first detected by placing the *larva* recently removed from the beast in warm water, when a considerable column of yellow pus was observed to rise from this aperture, which rendered it sufficiently visible. At other times, when closed, it was discernible with the utmost difficulty. At fig. 20, is represented this aperture (a), together with the two horny plates, which close up the air vessels, being a view, very considerably magnified, of the upper extremity of the *larva* fig. 1.

From a first view, this part would appear to be the head of the *larva*; but as it is found to produce the extremity of the abdomen in the future insect, it must be considered as the tail; and the above-mentioned minute aperture is undoubtedly the *anus*, and is found to be in conformity to the same situation of the *anus* in others of this genus.

At the lower end of the *larva*, fig. 1, a small indentation may, with attention, be observed, which is the mouth of the *larva*. It is a simple aperture, and altogether unprovided with any of the apparatus belonging to the mouths of *larvæ* in general; and near the mouth are seen two black points of horn, which appear to be perforated in the centre, and are found by dissection to be the termination of two considerable branches of the air tubes, and correspond to the two nipples on the last segment of the *larva* of the *Œ. Equi*, seen at fig. 22, a. An enlarged view of the mouth and inferior part of the *larva* of the *Œ. Bovis* is seen in fig. 21. Round the orifice of the mouth are placed some projecting *mamillæ*, which are imperforate, and perhaps serve the purpose of feelers.

The intestinal canal in this *larva* is a simple membranous tube, which

which extends from one extremity to the other, and serves the double purpose of stomach and intestine. The intestinal canal of the *larva* of the *Œ. Equi* is seen represented at fig. 26.

The apparatus of air tubes in this *larva* is very singular, and is represented somewhat magnified at fig. 25. In this species there are only two principal trunks of these air vessels, which are connected near their origin by a lateral trunk. From these, branches are seen passing off in every direction through the substance of the insect, some of them to the intestine, others to the skin, and a greater number appear to terminate by anastomosing with each other. As these air vessels form a much greater part of the structure of the *larva* of the *Œ. Equi*, it will be more proper to suspend our observations on them till we come to the description of that species.

The *larva* having arrived at its full growth, effects its escape from the abscess, by pressing against the external opening, which occasions its enlargement by the points pressed upon being gradually absorbed. When the opening has thus obtained the size of a small pea, the *larva* writhes itself through, and falls from the back of the animal to the ground, and, seeking a convenient retreat, becomes a *chrysalis*.

With considerable difficulty I obtained three *chrysalides* of this insect; one of which is represented at fig. 3.

These *larvæ* never change or throw off their skin, the same serving them through their whole growth; and it at length also serves to form the shell of the *chrysalis*. After leaving the abscess, and previous to their becoming a *chrysalis*, they contract themselves into much less space, and assume a different figure. See fig. 2. The sack which encloses the *larva* beneath the skin, is formed of a tough, thick membrane, and rough on the inside; and the pus secreted by it, is mostly of a yellow colour. After the exit of the caterpillar,

pillar, the wound in the skin is mostly closed up, and healed within a few days.

The *chrysalides* continued in that state from about the latter end of June until about the middle of August, when the fly appeared. I have, notwithstanding, observed full-grown *larvæ* in the backs of the cows as late as September, which must have produced their flies as late as November or December, or, perhaps, in the ensuing spring.

This *larva*, in making its exit, is exposed to imminent danger, if on land, of being trod on by the cattle, or picked up by birds. If in the water, where the cattle stand during great part of the day at this season of the year, it perishes, or becomes the food of fishes.

The perfect insect, on leaving the *chrysalis*, forces open a very remarkable, marginated, triangular lid, or *operculum* (see fig. 4), which may be traced in the skin of the *larva*, and is situated on one side of the small end.

The *Oestrus Bovis*, in its perfect state (fig. 5 and 6), is the largest of the European species of this genus, and is very beautiful. For its description see the conclusion of this paper.

Although its effects on the cattle have been so often remarked, yet the fly itself is rarely seen or taken, as the attempt would be attended with considerable danger. The pain it inflicts in depositing its egg is much more severe than in any of the other species. When one of the cattle is attacked by this fly, it is easily known by the extreme terror and agitation of the whole herd: the unfortunate object of the attack runs bellowing from among them to some distant part of the heath, or the nearest water, while the tail, from the severity of the pain, is held with a tremulous motion straight from the body, in the direction of the spine, and the head and neck are also stretched out to the utmost. The rest, from fear,
generally

generally follow to the water, or disperse to different parts of the field.

And such is the dread and apprehension in the cattle of this fly, that I have seen one of them meet the herd when almost driven home, and turn them back, regardless of the stones, sticks, and noise of their drivers; nor could they be stopped till they reached their accustomed retreat in the water.

When the oxen are yoked to the plough, the attack of this fly is attended with real danger, as they become perfectly uncontrollable, and will often run with the plough directly forwards, through the hedges, or whatever obstructs their way. There is provided, on this account, to many ploughs, a contrivance immediately to set them at liberty on such an occasion.

The singular scene attending the attack of this fly on the herd, has often been the subject of poetical description; but no one has more naturally or elegantly delineated it than the bard of Mantua:

*Est lucos Silari circa, ilicibusque virentem
Plurimus Alburnum volitans, cui nomen Afilo
Romanum est, Oestron Graii vertere vocantes:
Asper, acerba sonans: quo tota exterrita sylvis
Diffugiunt armenta; furit mugitibus æther
Concussus, sylvæque et ficci ripa Tanagri.*

GEORG. lib. iii. ver. 146—151.

The heifers, steers, and younger cattle, are the most frequently attacked by this fly, and have in general a greater number of bots than others:—the strongest and healthiest beasts seem constantly to be preferred by it, and this is a criterion of goodness in much esteem with the dealers in cattle*.

* The choice of a sound healthy subject for the deposition of the eggs, is probably caused by the solicitude of the parent for the safety of its offspring.

And

And the tanners also observe, that their best and strongest hides have the greatest number of bot-holes in them: for although the skin heals up on the exit of the *larva*, it is not with the same matter as the original skin; which has been remarked by late physiologists, and which this curious fact sufficiently confirms. In the leather, when dry, those holes which were made in the skin the year preceding the death of the beast, cannot be distinguished from the others which were made at any former period, not being in any perceptible degree less filled up. In the dried hide it does not appear a round hole as in the living skin, but as a crack only. This arises from the spongy substance which had filled the aperture, contracting in drying, and bursting, and also from the artificial mode of hammering and preparing the hide.

The female fly is very quick in performing the operation of depositing its egg: she does not appear to remain on the back of the animal more than a few seconds; and I have not observed that the cow ever attempts to lash this insect off with her tail, which she performs so dexterously when attacked by other flies*.

The whole of this genus of insects appear to have a strong dislike to moisture, since the animals find a secure refuge when they get into a pond or brook, where the *Tabani*, *Conopes*, and other flies, follow without hesitation, but the *Oestri* rarely or never; and during cold, rainy, or windy weather they are not to be seen.

The *larvæ* of this insect are mostly known among the country people by the name of *wornuls*, *wormuls*, or *warbles*, or more properly *bots*.

* It has been doubted by Linnæus, and some other writers (I know not why), whether it settles in depositing its egg. The evident suffering of the animal sufficiently evinces this: perhaps the remark was intended for the *Œ. Equi*.

Of the *OESTRUS Equi*.

THE *larva* of this fly is that which is very commonly found in the stomach of horses, and is represented in fig. 7.

These *larvæ* attach themselves to every part of the stomach, but are generally most numerous about the *pylorus*; and are sometimes, though much less frequently, found in the intestines.

Their numbers in the stomach are very various, often not more than half a dozen, at other times more than a hundred, and, if some accounts might be relied on, even a much greater number than this. They hang most commonly in clusters, being fixed by the small end to the inner membrane of the stomach, which they adhere to by means of two small hooks, or *tentacula*. Of these a representation considerably enlarged is seen in fig. 22.

When they are removed from the stomach they will attach themselves to any loose membrane, and even to the skin of the hand. For this purpose they sheath or draw back the hooks almost entirely within the skin, till the two points come close to each other; they then present them to the membrane; and keeping them parallel till it is pierced through, they expand them in a lateral direction, and afterwards, by bringing the points downwards towards themselves, they include a sufficient piece of the membrane, and remain firmly fixed for any length of time, without requiring any farther exertion.

These hooks, the better to adapt them to this purpose, appear to have a joint near their base. The *larvæ* of *Œ. hæmorrhoidalis* and *ovis*, and probably all those which feed on the mucous membranes lining the internal canals of the body, are also furnished with these *tentacula*; whilst those *larvæ* which inhabit be-
neath

neath the skins of various animals will be found universally without them*.

The body of the *larva* is composed of eleven segments, all of which, except the two last, are surrounded with a double row of horny bristles directed towards the truncated end, and are of a reddish colour, except the points, which are black. These *larvæ* evidently receive their food at the small end by a longitudinal aperture, which is situated between the two hooks or *tentacula*. See fig. 22, a. The lips of this aperture appear somewhat hard, horny, and irregular.

Their food is probably the chyle, which, being nearly pure aliment, may go wholly to the composition of their bodies without any excrementitious residue, though on dissection the intestine is found to contain a yellow or greenish matter, which is derived from the colour of the food, and shews that the chyle, as they receive it, is not perfectly pure.

* They are wanting in the *Æ. Tarandi*, whose *larva* I have seen; and also in a new and singular species, which inhabits beneath the skin of the rabbits and hares of Georgia in America. This species having never been described by any writer I am acquainted with, I take this opportunity of introducing a description of it, from a specimen in the excellent cabinet of Mr. Francillon.

Æ. cuniculi. Niger, alis fuscis, thorace ad medium nigro, postice, abdominisque basi pilis flavescens.

Habitat in Georgia Americana.

Descr. *Æ.* bovino nostro bis major, caput nigrum, oculis fuscis, fronte vesiculari porrectâ. *Thorax* antice nigricans, angulo obtuso ad medium; postice, lateribus, scutelloque flavis. *Abdomen* nigrum basi et lateribus segmentorum flavis. *Alæ* glaucescentes seu fusca. *Corpus* subtus nigrum. *Pedes* nigri.

Larva fusca undique muricata aculeis minutissimis, sub cute leporum et affinium habitat.

From the extraordinary size of this *Oestrus*, I should be led to imagine it was originally destined to infest some much larger animal, which perhaps may be extinct.

The slowness of their growth and the purity of their food must occasion what they receive in a given time to be proportionably small; from whence probably arises the extreme difficulty there is found in destroying them by any medicine or poison thrown into the stomach. After opium had been administered to a horse labouring under a case of locked jaw for a week, in doses of one ounce every day, on the death of the animal I have found the bots in the stomach perfectly alive. Tobacco has been employed in much larger quantities in the same complaint, and has been also longer continued without destroying them. They are also but rarely affected by the drastic purgatives which bring away in abundance the *Teniæ* and *Ascarides*.

I do not apprehend they are so very injurious to the horses as is generally conceived. When removed from the stomach a deep impression remains where they adhered; but whether they ever irritate it so as to bring on a fatal spasm of the stomach itself, or of the *pylorus*, or, by collecting round this passage, prevent the food from entering the intestine, has, I believe, never been investigated with sufficient accuracy. The ignorant surprise of farriers on opening the stomach after death, and being presented with so singular an appearance as the bots, has, without doubt, very often occasioned the death to be attributed to these, though it is certain but few horses on our commons can escape them. At the extremity of the truncated end are seen two protuberant kind of lips, applied to each other. See fig. 7, a. When these unfold, or are removed with the knife, a plate of horny or cartilaginous consistence is seen, having six semicircular lines, with their points opposed to each other. See fig. 23. These lines are rough, and made up of alternate depressed and elevated spots of black and white.

Through this plate the air is admitted to fill the air tubes; and in
most

most of the *larvæ* of this class there are two distinct plates for this purpose, one on each side.

That the air is admitted by these means, is proved by immersing one of the *larvæ* of this class of insects in a vessel of water; when a bubble may be extricated by pressure, and may be distinctly seen forming in the water, and on removing the pressure the bubble will be again entirely re-absorbed.

In the *larvæ* of the *Musca tenax* and *pendula*, instead of a horny plate of this kind, there is provided a slender tail of considerable length, with a perforated cartilaginous tube passing through it; and the extremity of this tube is elevated above the surface of the putrid water in which they live, and conveys air to the *larva* beneath.

On opening the body of the bot, and removing the gelatinous matter, the air tubes are seen of a splendid silvery colour, as though injected with the purest mercury. They remain distended by their own inherent elasticity, and are filled with air to their minutest ramifications. Their appearance is singularly beautiful, especially if the bot be alive, or recently dead. This glittering appearance arises from the air being seen through the semitransparent, refracting coats of the vessel.

In this species the principal trunks of the air vessels are no less than ten in number, which by dissection are found to open with the large ends (see fig. 26, a) into one common reservoir beneath the cartilaginous plate: this being removed with a knife, exhibits the mouths of the tubes as they are arranged at fig. 24. The branches proceeding from these vessels terminate on the viscera and skin, in a similar manner to the air vessels of the former species.

Two considerable trunks or tubes could be traced till they terminated in the two small prominent points on the edge of the first segment. See fig. 22, a.

The

The lips at the obtuse end of the bot seem designed to prevent the gastrick and other secretions of the stomach, assisted by its heat and action, from injuring the cartilaginous plate; for we do not discover any apparatus of this nature to cover these plates in the *Œ. Ovis* or *Bovis*, which, though allied in all other respects, are not exposed to these circumstances.

These lips are found, on opening them, to be mere membranous bags, filled with a watery fluid; a convincing proof they do not form any part in the future insect, and are merely for the convenience of the *larva*.

Respiration appears to be the office of these air canals, which are the lungs of the *larva*; and, considered in this point of view, they are much larger than the respiratory organs of any other animal: which is the more extraordinary, if the purpose of respiration in animals be the production of animal heat, as the later chemists suppose, this being altogether unnecessary to *larvæ* that are supplied so abundantly with it from the high temperature of their residence in the living stomach, and have a greater share of it than is probably pleasant to them; nor can these organs be formed for the purposes of the future insect, since they cannot be detected in either the *chrysalis* or fly.

I have since found that air vessels of a similar structure may be detected in the *larvæ* of most insects, as well in those that are not exposed to any extraordinary temperature as those that are; they are therefore not constructed with any view to these singular situations.

From the superior magnitude of the respiratory organs in most of the *larvæ* of insects, one should be almost led to imagine that the respiration in all animals was more intimately connected with the reception of food, and the converting it into living matter, than any other design.

In corroboration of this we may observe, that while the respiratory organs are so large in the *larva*, they are remarkably small in the perfect insect, which also, in general, has occasion for very little food.

Perhaps the superior size of the air vessels of the bot, compared with the *larvæ* of other insects, arises from the greater rarefaction and impurity of the air it is exposed to in the stomach, which may render a larger portion of it necessary. The remaining undecomposed air in the air tubes appears to pass out by means of the *spiracula* principally, and also perhaps by the two horny points observable on the first segment. See fig. 22, a.

Upon this subject it may not be improper to notice the air vessels of the *larva* of the *Musca pendula*, which are constructed in a very different way from any others I have seen. The two principal trunks in this *larva* are made up of semicircular cartilaginous rings or fibres, which are disposed in a spiral direction, so as to form the tube. It is evident by this structure, that the area of the tube may be entirely obliterated, and the sides be brought into contact.

The convenience attending this structure, to a *larva* living in putrid fluids of considerable depth, appears to be, that beside its use in respiration, it may serve the same office as the air bladder in fishes, regulating by its contraction, or expansion, the density or rarity of the included air, and consequently the descent or ascent of the *larva* in those fluids.

The *larvæ* of the *Œ. Equi* attain their full growth about the latter end of May, and are coming from the horse from this time to the latter end of June, or sometimes later. On dropping to the ground they find out some convenient retreat, and change to the *chrysalis*; and in about six or seven weeks the fly appears.

Though this is by far the most common species of the genus, I
have

have not been able to obtain a *chrysalis* of it for delineation; but it nearly resembles that of *Œ. hæmorrhoidalis*, except in size.

There is a considerable difference between the male and female fly: a delineation of each is given, fig. 8 and 9; and to prevent unnecessary repetition, they are described, together with the other species, at the conclusion of the paper.

Perhaps it will be hardly necessary to apologize to the Society for the alteration of the Linnæan name *Bovis* to that of *Equi*, as the former, if retained, would continue to convey a very erroneous idea; and it would, without doubt, have been changed by Linnæus himself, had he been in possession of these facts, who considered trivial names not as fetters to the science, but as temporary conveniences, to be altered or retained as time and further discovery might prove them to be just. On the other hand, wanton and unnecessary alteration, on slight pretences, certainly cannot be too much reprobated.

The mode pursued by the parent fly to obtain for its young a situation in the stomach of the horse is truly singular, and is effected in the following manner:—When the female has been impregnated, and the eggs are sufficiently matured, she seeks among the horses a subject for her purpose, and approaching it on the wing, she holds her body nearly upright in the air, and her tail, which is lengthened for the purpose, curved inwards and upwards: in this way she approaches the part where she designs to deposit the egg; and suspending herself for a few seconds before it, suddenly darts upon it, and leaves the egg adhering to the hair: she hardly appears to settle, but merely touches the hair with the egg held out on the projected point of the abdomen. The egg is made to adhere by means of a glutinous liquor secreted with it. She then leaves the horse at a small distance, and prepares a second egg, and,
poising

poising herself before the part, deposits it in the same way. The liquor dries, and the egg becomes firmly glued to the hair: this is repeated by various flies till 4 or 500 eggs are sometimes placed on one horse.

The horses, when they become used to this fly, and find it does them no injury, as the *Tabani* and *Conopes*, by sucking their blood, hardly regard it, and do not appear at all aware of its insidious object.

The skin of the horse is always thrown into a tremulous motion on the touch of this insect, which merely arises from the very great irritability of the skin and cutaneous muscles at this season of the year, occasioned by the continual teasing of the flies, till at length these muscles act involuntarily on the slightest touch of any body whatever.

The inside of the knee is the part on which these flies are most fond of depositing their eggs, and next to this on the side and back part of the shoulder, and less frequently on the extreme ends of the hairs of the mane. But it is a fact worthy of attention, that the fly does not place them promiscuously about the body, but constantly on those parts which are most liable to be licked with the tongue; and the *ova* therefore are always scrupulously placed within its reach. Whether this be an act of reason or of instinct, it is certainly a very remarkable one. I should suspect, with Dr. Darwin*, it cannot be the latter, as that ought to direct the performance of any act in one way only.

Whichever of these it may be, it is, without doubt, one of the strongest examples of pure instinct, or of the most circuitous reasoning any insect is capable of. The eggs thus deposited

* Zoonomia. Vid. Chapter on Instinct.

I at first supposed were loosened from the hairs by the moisture of the tongue, aided by its roughness, and were conveyed to the stomach, where they were hatched; but on more minute search I do not find this to be the case, or at least only by accident; for when they have remained on the hairs four or five days they become ripe, after which time the slightest application of warmth and moisture is sufficient to bring forth in an instant the latent *larva*. At this time, if the tongue of the horse touches the egg, its *operculum* is thrown open, and a small active worm is produced, which readily adheres to the moist surface of the tongue, and is from thence conveyed with the food to the stomach. If the egg itself be taken up by accident, it may pass on to the intestinal canal before it hatches; in which case its existence to the full growth is more precarious, and certainly not so agreeable, as it is exposed to the bitterness of the bile.

I have often, with a pair of scissars, clipped off some hairs with the eggs on them from the horse, and on placing them in the hand, moistened with saliva, they have hatched in a few seconds. At other times, when not perfectly ripe, the *larva* would not appear, though held in the hand under the same circumstances for several hours; a sufficient proof that the eggs themselves are not conveyed to the stomach.

It is fortunate for the animals infested by these insects that their numbers are limited by the hazards they are exposed to. I should suspect near a hundred are lost for one that arrives at the perfect state of a fly. The eggs, in the first place, when ripe, often hatch of themselves, and the *larva*, without a *nidus*, crawls about till it dies; others are washed off by the water, or are hatched by the sun and moisture, thus applied together.

When in the mouth of the animal they have the dreadful ordeal

of the teeth and mastication to pass through. On their arrival at the stomach, they may pass, mixed with the mass of food, into the intestines; and, when full grown, on dropping from the *anus* to the ground, a dirty road or water may receive them.—If on the commons, they are in danger of being crushed to death, or of being picked up by the birds who so constantly for food attend the footsteps of the cattle. Such are the contingencies by which Nature has wisely prevented the too great increase of their numbers, and the total destruction of the animals they feed on.

I have once seen the *larva* of this *Oestrus* in the stomach of an ass: indeed there is little reason to doubt their existence in the stomachs of all this tribe of animals.

The perfect fly but ill sustains the changes of weather; and cold and moisture, in any considerable degree, would probably be fatal to it. These flies never pursue the horse into the water. This aversion I imagine arises from the chilness of that element, which is probably felt more exquisitely by them, from the high temperature they had been exposed to during their *larva* state. The heat of the stomach of the horse is much greater than that of the warmest climate, being about 102 degrees of Fahrenheit, and in their fly state they are only exposed to 60, and from that to about 80 degrees. This change, if suddenly applied, would, in all probability, be fatal to them; but they are prepared for it, by suffering its first effects in the quiescent and less sensible state of a *chrysalis*. I have often seen this fly during the night-time, and in cold weather, fold itself up, with the head and tail nearly in contact, and lying apparently in a torpid state, though in the middle of summer.

It is worthy of remark, that the greater part of the *ova* deposited by this fly, are taken up in consequence of the irritations of other flies, as the *Conopes*, *Tabani*, and *Musca*, who, by settling on the skin,

occasion the horse to lick himself in those parts, and thus receive the *larvæ* on the tongue and lips; and a horse that has had no *ova* deposited on him, may yet have the bots by performing the friendly office of licking another horse that has. The eggs on the shoulder are particularly well disposed for being received in this way.

Whether these *larvæ* can exist in the stomach of a carnivorous animal I am not certain. I gave upwards of a hundred eggs (proved by trials to be ripe, and containing a living caterpillar) to a cat in milk, at various times; and on destroying her at the end of two months after the first portion had been given, no traces of them in the stomach or intestines could be discovered.

The small end of the *chrysalis*, in all the species of this genus, contains the head of the fly, the contrary being the case with almost all other insects.

Of the *OESTRUS hæmorrhoidalis*.

THE *larva* of this insect needs not to be particularly described, as it resembles in almost every respect that of the *Œ. Equi*. Its habits are the same, being seen in the stomach of the horse occupying the same situation as those of the *Œ. Equi*, from which they can only be distinguished by their smaller size and greater whiteness. See fig. 10.

On dissection it is found to possess similar air tubes and alimentary canal. When it is ripe, and has passed through the intestines, its skin becomes of a greenish-red hue. It generally assumes the *chrysalis* state in about two days after leaving the *rectum*, and is then of a deep-red colour. See fig. 11.

The *larvæ* of this and the preceding species may be obtained from the horse from the beginning of June to the middle of July, being found hanging to the extremity of the *rectum*. None of these *larvæ*

ever

ever appear to change their skin. — If they did, it is probable they would lose their hold, as the hooks are principally connected with the skin, and separate with it by maceration, leaving only an indentation where they were lodged.

These *larvæ*, being forcibly squeezed, contract themselves into a smaller space, and become very hard. It is probable they in this way resist the violent pressure they must occasionally sustain, from the weight of the food and the actions of the stomach, and in passing through the intestines and the *sphincter ani*.

After remaining in the *chrysalis* state about two months, the fly appears. See fig. 12 and 13,—the male and female,—and their description in the sequel of the paper.

This species may still retain the name of *hæmorrhoidalis*, without any impropriety, not from the supposed history of its entering the *anus*, but from the termination of the *abdomen* being red, Linnæus having generally chosen to distinguish the insects so marked by that name; also from their resembling the *hæmorrhoids* or *piles*, while hanging to the extremity of the *rectum* *.

It seems hitherto to have been generally believed among naturalists, that the female fly enters the *anus* of the horse in a very extraordinary manner, to deposit its eggs †.

* The idea entertained by the Romans of this appearance is truly singular: Hujusmodi passionis signum est (morbus coriaginosus) cum invenitur humor in ano fabæ coctæ similis: est namque sanies ex illis vulneribus quæ bestiolæ intrinsecus fecerunt. *Flavius Vegetius de Arte Veterinaria*, ed. Manheim. p. 63.

† Reaumur, tom. iv. p. 543, relates this circumstance on the authority of Dr. Gaspari. From the account of its getting beneath the tail, I should suspect the fly he saw was the *Hippobosca equina*, which frequently does this. Its getting within the *rectum* appears to have been additional. That a fly might deposit its eggs on the verge of the *anus* is not impossible, though we know no instance of it.

The objections to this idea are—that the *anus* is rather closed than opened by any irritation externally applied.—The fly would be crushed in attempting to pass the *sphincter* of a horse's *rectum*; and having no means of holding while depositing its eggs, it would be quickly evacuated with the dung.—The whole of the *ova*, to the amount of 2 or 300, must be deposited in one horse, as it is impossible, if the fly survived, that it could undergo this punishment a second time, for the heat and moisture of the *rectum* would at least destroy its wings.

I mention these objections, not as merely relating to this species, but that it may not be credited of the *Æ. nasalis*, or indeed of any of them, that they really enter the body of the animal to obtain for their young a situation there.

I have not seen any writer who has described the mode in which this fly deposits its *ova*; which having had repeated opportunities of seeing, I can speak of with certainty.

The part chosen by this insect for this purpose is the lips of the horse, which is very distressing to the animal from the excessive titillation it occasions; for he immediately after rubs his mouth against the ground, his fore-legs, or sometimes against a tree; or if two are standing together they often rub themselves against each other. At the sight of this fly the horse appears much agitated, and moves his head backwards and forwards in the air, to baulk its touch, and prevent its darting on the lips; but the fly, watching for a favourable opportunity, continues to repeat the operation from time to time; till at length finding this mode of defence insufficient, the enraged animal endeavours to avoid it by galloping away to a distant part of the field. If it still continues to follow and tease him, his last resource is in the water, where the *Oestrus* never is observed to follow him.

The

The teasing of other flies will sometimes occasion a motion of the head similar to this; but it should not be mistaken for it, as it is never in any degree so violent as during the attack of the *Oestrus*.

At other times this *Oestrus* gets between the fore-legs of the horse whilst he is grazing, and thus makes its attack on the lower lip: the titillation occasions the horse to stamp violently with his fore-foot against the ground, and often strike with his foot as though aiming a blow at the fly. They also sometimes hide themselves in the grass; and as the horse stoops to graze they dart on the mouth or lips, and are always observed to poise themselves during a few seconds in the air, while the egg is preparing on the point of the abdomen.

When several of these flies are confined in a close place, they have a particularly strong fusty smell; and I have observed both sheep and horses, when teased by them, to look into the grass and smell to it very anxiously; and if they by these means discover the fly, they immediately turn aside and hasten to a distant part of the field.

The eggs of this species appear of a darker colour than the former, and the circumstances attending their passage to the stomach I am unacquainted with.

The *larva* of the *Œ. hæmorrhoidalis*, as well as the former species, appears to have been termed among the Romans, *Cossus**, which seems to have been a general expression for any kind of soft imperfect animal, and to have been very analogous, and as extensively applied as the word *grub* is at present in the English language.

The learned Charlton (*Onomasticon Zoicon*, p. 56), and afterwards Dr. Johnson (see Dictionary), have considered *ascarides* as the syno-

* Vide *Flavius Vegetius Renatus de Arte Veterinaria*, p. 62, 64, 69, ed. Manb.

nymous term among the ancients for the bots: that term has always been applied to the thin smooth worms of the intestines, but, I apprehend, never to these.

Our ancestors imagined that poverty, or improper food, engendered these animals, or that they were the offspring of putrefaction. In Shakspeare's *Henry the Fourth, Part I*, the ostler at Rochester says: "Pease and beans are as dank here as a dog, and that is the next way to give poor jades the bots;" and one of the misfortunes of the miserable nag of Petruchio is, that "he is so begnawn with the bots."

When the animal is kept from food the bots are also, and are then, without doubt, the most troublesome; whence it was very naturally supposed that poverty or bad food was the parent of them.

They also appear to have gone formerly in this country by the name of *truncheons*. In Blundeville, who wrote on farriery during the reign of Queen Elizabeth, we have the following passage:—"The second sort of worms have great heads and small long tails, like a needle, and be called bots: the third be short and thick, like the end of a man's little finger, and be called truncheons."

Of the OESTRUS veterinus.

THIS species seems to have been only well described by Linnæus, who called it *nasalis*, from an idea of its entering the nostrils of the horse to deposit the eggs*, which it could not well do without destroying the wings, and is therefore probably as much a fable as the "*mirè per anum intrans*" of the *Œ. hæmorrhoidalis*. I have seen four

* Habitat in equorum fauce per nares intrans. *Linn. Syst. Nat.* 2. p. 969.

chrysalides of this fly, which I uniformly found under the dung of horses. They produced the flies, male and female, represented at fig. 18 and 19; but not having at that time any idea of writing on this subject, I unfortunately threw away the *chrysalides*. The *larva* I am at present unacquainted with; but if it inhabited the *fauces* of the horse, it would produce such troublesome symptoms as could not easily escape the notice of those whose business it is to attend to the diseases of cattle. Such a disease has, however, never been described by any writer on this science; nor, after an extensive opportunity both in the dead and living subject of observing them, have I ever seen a bot in the *fauces*. Perhaps the bots of the stomach having crawled to the *fauces* in search of food might have given rise to this idea, or they may even have accidentally bred there; for there is little doubt these animals can live in any part whatever of the alimentary canal.

I am induced to suspect they inhabit the stomach, as well as the two former species; but of this we must at present remain in uncertainty, as well as of the manner in which this species deposits its eggs.

I have given it the name of *veterinus*, because beasts of burden are particularly subject to it, in preference to the erroneous one of *nasalis*.

Of the OESTRUS Ovis.

I PROCURED about the middle of June some full-grown *larvæ* of the *Œ. Ovis*, from the inside of the cavities of the bone which supports the horns of the sheep. See fig. 14.

They are nearly as large as those of the *Œ. Equi*, of a delicate white colour, flat on the under side, and convex on the upper; having no spines at the divisions of the segments, though they are provided with *tentacula* at the small end. The other end is truncated with a

prominent ring or margin, which serves the same purpose in an inferior degree as the lips of the *Œ. Equi* and *hæmorrhoidalis*, by occasionally closing over, and cleaning the horny plate. When this margin opens after closing over the plate, it occasions frequently a slight snap from the sudden admission of the air.

When young these *larvæ* are perfectly white and transparent, except the two horny plates, which are black. As they increase in size the upper side becomes marked with two transverse brown lines on each segment, and some spots are seen on the sides.

They move with considerable quickness, holding with the *tentacula* as a fixed point, and drawing up the body towards them. On the under side of the *larva* is placed a broad line of dots, which, on examination with glasses, appear to be rough points, serving perhaps the double purpose of assisting their passage over the smooth and lubricated surfaces of these membranes, and of exciting also a degree of inflammation in them where they rest, so as to cause a secretion of lymph or pus for their food.

I have mostly found these animals in the horns and frontal sinuses, though I have remarked that the membranes lining these cavities were hardly at all inflamed, while those of the maxillary sinuses were highly so. From this I am led to suspect they inhabit the maxillary sinuses, and crawl, on the death of the animal, into these situations in the horns and frontal sinuses.

The breeds of these, like the *Œ. Bovis*, do not appear confined to any particular season; for quite young and full-grown *larvæ* may be found in the sinuses at the same time.

When full-grown they fall through the nostrils, and change to the *pupa* state, lying on the earth, or adhering by the side to a blade of grass. See fig. 15.

The fly bursts the shell of the *pupa* in about two months. See

fig. 16 and 17. The manner in which this species deposits its *ova* has, I believe, not been described; nor is it easy to see, though close to the animal at the time, exactly in what way this is accomplished, owing to the obscure colour and rapid motion of the fly, and the extreme agitation of the sheep; but the motions of the sheep afterwards, and the mode of defence it takes to avoid it, can leave but little doubt that the egg is deposited on the inner margin of the nostril.

The moment the fly touches this part of the sheep, they shake their heads, and strike the ground violently with their fore-feet; at the same time holding their noses close to the earth they run away, looking about them, on every side, to see if the fly pursues: they also smell to the grass as they go, lest one should be lying in wait for them. If they observe one, they gallop back, or take some other direction. As they cannot, like the horses, take refuge in the water, they have recourse to a rut, or dry dusty road, or gravel pits, where they crowd together during the heat of the day, with their noses held close to the ground, which renders it difficult for the fly conveniently to get at the nostril.

Observations on these flies are best made in warm weather, and during the heat of the day, when, by driving the sheep from their retreats to the grass, the attack of the fly and the emotions of the sheep are easily observed.

I imagine the nostril, from repeated attacks, and the consequent rubbing against the ground, becomes highly inflamed and sore, which occasions their touch to be so much dreaded by the sheep.

From the difficult and very precarious mode this species and the *hæmorrhoidalis* pursue in depositing their eggs, they cannot successfully deposit more than half of them.

General Observations on the Oestri.

HAVING traced these animals separately through their various changes, it may not be improper to conclude the account by a general review of their good or ill effects on the animals that are subject to them.

Though the attention of naturalists is at present chiefly occupied with the formation of a nomenclature and descriptions to every object of the science; yet this, though difficult and highly important, is not so much the ultimate aim of natural history as a knowledge of their economy and properties; as from these we are taught the most effectual means of avoiding the consequences of the injurious, and of protecting such as can be usefully applied to the purposes of mankind.

If, after mature enquiry, the existence of the *Oestri* should be proved in a greater degree injurious than any service they can afford, their numbers might be considerably reduced, and a total extirpation of some of the species would, I am disposed to believe, be not altogether impracticable.

The injury derived from their depredations is principally felt by the tanners, whose hides are often so perforated by these animals as to be considerably damaged thereby; and the loss of a horse or a sheep may sometimes perhaps be occasioned by the existence of the other species.

If it were desirable to lessen their numbers, the following, I apprehend, would be the most successful means:

The *larva* of the *Œ. Bovis*, which breeds in the backs of the horned cattle, is so conspicuous that it is more easily destroyed than the others: the injection of any corrosive liquor into the *sinus* would

would kill it; or by puncturing the *larvæ* with a hot needle, introduced through the apertures in the skin, or even by simple pressure, they may be destroyed, afterwards extracting them, or leaving them to slough away, which I have frequently observed they do when crushed by a blow from the horn of the beast, or by any other accident, without any material injury to the animal. A man employed for this purpose might, in half a day, in this manner destroy every bot on a large common.

In regard to the *Œ. Equi* and *hæmorrhoidalis*, those who have horses which have been much out to grass the preceding year, in countries where these flies are prevalent, might considerably diminish their numbers by examining the horses occasionally for the bots during the months of May and June, when they will be found hanging to the extremity of the *rectum*, where they remain for some time before they fall to the ground.

The destruction of a single one at this season of the year is not only the death of an individual and its effects, but the almost certain destruction of a numerous family; at the same time it is also highly useful in preventing the irritation which the spines of the bot occasion to the *anus*. If the horse is used on the road while the bot is adhering to this part, the irritation becomes distressing, and causes him to move very awkwardly and sluggish, as though tired; and if severely beaten he soon relapses again into the same awkward action. As this most frequently happens during warm weather, it is in general attributed to mere laziness.

These symptoms I have been a witness to several times, to the severe chastisement of the horse and vexation of the rider: on the removal of the bot the cure is instantaneous.

If this mode of removing them was generally complied with, but few could escape, and their numbers would be very much reduced; and.

and those who wish to obtain them for cabinets of natural history, or for examination, will also find this the most effectual way.

We know of no medicine that will detach them from the stomach or intestines, though there are not wanting abundance of infallible nostrums among the very numerous professors of this art.

Another both easy and effectual mode, at least for the *Æ. Equi*, is to destroy the eggs which are deposited on the hairs of the horse, and are easily seen and removed by a pair of scissars, or by means of a brush and warm water.

In the sheep it will be much more difficult to prevent or destroy them by any of these means; particularly if they are seated in the maxillary sinuses: in this case trepanning would be insufficient, as they would probably be concealed among the convolutions of the turbinated bones.

Perhaps the removal of the sheep to a distant pasture, during the months of June and July, while greatest part of the bots are yet on the ground in the *chrysalis* state, and not bringing them on the pasture again till the setting in of the winter, would be the means of destroying them most effectually; and if repeated for two or three years successively, when they are particularly troublesome, the farmers might eventually find their account in it.

On the other hand, notwithstanding the apparently unnecessary existence and cruel effects of the *Oestri*, they are probably not altogether without an use, or were designed by Providence to add, without a recompense, to the numerous sufferings of these useful and laborious creatures.

A physiological view of their effects will, perhaps, best justify their existence, and save them from such an imputation.

The *larvæ* of the *Oestri*, when applied under proper restrictions, and to a certain extent, may be of greater utility than from our
present

present very limited knowledge of them we are able to discover; but we may venture to remark, that their effect in keeping up a considerable degree of irritation in the membranes on which they are situated, may, perhaps not inaptly, be compared to that of a perpetual issue or blister. Nor is there wanting abundant proof of the utility of local irritations in preventing the access, as well as in curing disorders. We often see a formidable disease quickly removed by blistering the skin, or by irritating the mucous membrane of the stomach or intestines by a vomit or purge. The appearance of exanthematous eruptions on the skin, and the formation of local abscesses, from the same cause of partial irritation, often relieve a general disorder of the system. The mucous membranes and the skin possess this power when irritated in the most eminent degree, and to these the *larvæ* of the *Oestri* are applied. Irritating the membranes of the stomach in other animals would excite nausea and vomiting; but the horse not possessing this power, his stomach is peculiarly fitted for the stimulus of such inhabitants.

It has also been remarked in hospitals, that a patient afflicted with a wound, ulcer, or other severe local complaint, is not so susceptible of the contagion of a fever or other general disorder.

How far the access of those dreadful disorders which sometimes arise of themselves in cattle and horses, and afterwards become contagious, as the murrain, glanders, farcy, &c. may be prevented by these peculiar irritations, it will not be easy to discover; nor whether that singular tendency or disposition in the horse to inflammatory complaints, as the *caligo* of the eyes, termed moon-blindness, inflammations of the lungs and of the bones, as spavins, splints, &c. may be in any degree checked or subdued by the application of these local *stimuli*.

In confirmation of this suggestion I may remark (although I am
aware

aware other reasons may be also assigned for it), that those horses which are not exposed to the bots, more frequently are infected with the glanders, farcy, &c. as those of the army, post-coaches, post-waggons, and dray-horses, these being rarely spared, from the nature of their work, to graze on the commons, and thus be exposed to receive them.

If, after a more minute research into their effects on the system, the utility of these native *stimuli* of animals should be established, and, like the leech, or the *cantharides*, they should be called in to the aid of veterinary medicine, it would not be impracticable to administer them artificially by means of their *ova*.

If the stimulus is considered as of too gentle a nature, it is in some measure atoned for by its permanency, and the unlimited power of increasing their numbers; at least, by the administration of them in this way, we might accurately ascertain their real effects, and whether they are so fatal as has been imagined.

Linnæus has also observed of the *pediculus*, “rodendo caput
“ exciit achores, apud puerulos voraces incarceratos, indeque stru-
“ mosos, sicque præservat a coryza, tussi, cæcitate, epilepsia,” &c.

In the same way the worms in children, I am induced to believe, are wholesome to them in a certain quantity, by constantly irritating the membranes of the intestines, and preventing the access of worse disorders. But however useful a few of these natural *stimuli* of animals may be, the increase of their numbers, by producing bad consequences, should at all times be prevented.

The sheep are particularly subject to disorders attended with *vertigo*, probably arising from an affection of the brain; and the *larvæ* of the *CE. Ovis* are certainly very favourably situated on the neighbouring membranes of the maxillary sinuses, and may perhaps tend to divert the attack of this disorder, or render it less fatal.

Remarks on the generic and specific Characters of the OESTRI.

THE characters which distinguish this genus have been described so very oppositely by various writers, that I cannot well conclude this paper without taking some notice of these also; and having many specimens of them in my possession I was induced to dissect them for this purpose. The result of the enquiry has been the discovery of characters considerably different from those which have hitherto been assigned them.

The excellent *Scopoli*, conscious of the obscurity of this genus, has altogether omitted giving any account of them in the *Entomologia Carniolica*.

And if we except the mistake of the *Œ. Equi* for *Bovis*, the clearest and best account of the species is still to be seen in Linnæus.

Fabricius, in his *Species Insectorum**, has nearly copied the Linnæan account of the *Oestri*; but in a subsequent work of this author, the *Mantissa Insectorum*†, a species under the title of *Equi* is introduced, and the species *Œ. hæmorrhoidalis* and *veterinus* are considered as varieties α and β ! while the error relating to the true *Equi* is continued under the name of *Bovis*.

The most extensive enumeration of the species of this genus may be seen in Professor Gmelin's‡ new edition of the *Systema Naturæ*; but the errors relating to the species have been in that work considerably increased. Instead of placing the *Equi* in the name of *Bovis*, as his excellent original had done, we find the *hæmorrhoidalis*; and by placing the *Equi* again in the name of *hæmorrhoidalis*, and mixing the references to each, an almost inextricable labyrinth of confusion is the consequence, while the true *Bovis* still escapes undescribed, unless as being the same as *hæmorrhoidalis*.

* *Species Insectorum*, vol. ii. p. 398.† *Mantissa Insectorum*, vol. ii. p. 321.‡ *Gmelin. Syst. Nat. par. iv. p. 2810.*

The mistake of *hæmorrhoidalis* for *Bovis* arose probably from their similarity in description, in which they certainly interfere very much; though no two species can be more distinct when seen together than these. This will ever be the bane of compilation in natural history.

It has been doubted whether these animals possess any mouth: Linnæus expressly says, "*Os nullum punctis tribus;*" but when the hairs are removed, which in every species very much obscure the parts of the mouth, two clavated *palpi* are seen, and between them the opening of the mouth; and by laying open the vesicular or inflated part of the face, the continuation of it is visible in the form of a membranous *haustellum*, which is generally coloured with some dark brown matter lodging on the inside; though I confess, after repeated dissections, I have not been able to trace this *haustellum* farther than the inside of the inflated part of the head, where it appears to enlarge and terminate.

Fabricius has minutely described *labia* to the *haustellum*, and other apparatus to the mouth, which I have not been fortunate in obtaining a sight of. At the same time, I cannot help being surpris'd that he should have overlooked the *palpi*, which he expressly denies the existence of, though tolerably visible even without the aid of glasses*.

What farther circumstances I have observed, in regard to the generic characters of these insects, I have stated in the following Latin descriptions of them, and have also added there what was farther necessary to complete the foregoing account, with some alterations in the specific descriptions of them.

I have, since writing the above, been enabled to collect the *synonyma* more fully, and to examine all the authors who have treated on this subject, from the invaluable library of Sir Joseph Banks,

* *Fabricii Genera Insectorum.*

whose generous liberality in promoting useful research by this indispensable aid can never be too much admired.

The result of this enquiry has induced me with the greater readiness to offer these remarks to the Society, from the irreconcilable descriptions and difficulties which will be found in the best writers, who have endeavoured to describe the present genus.

I have omitted the reference to Ray, because the description, if meant for the *Œ. Equi*, is hardly worth preserving. From the "*alis crebris punctis*," one should suppose the *Tabanus pluvialis* was intended by this description.

From the observations of *Wohlfarbt*, "*De vermibus per nares excretis*," it appears not improbable that the *Œ. Ovis*, under a favourable opportunity, and perhaps deprived of its usual *nidus*, had deposited its eggs in the human nostril, as I know of no other *larva* of this kind that could sustain the temperature of that situation; yet the figures given of the flies observed by him do not much resemble *Oestri**.

J. Leonhard Fischer (*Disputatio Inauguralis. Lipsiæ 1788*) has given an elaborate description of the *Œ. Bovis* and *Ovis*.

In the *Anfangsgründe der Naturgeschichte* of *Leske*, the *larva*, tab. 9, fig. 19, is that of the *Equi*; while the fly (fig. 21) is the *Œ. Bovis*.

De Geer, who for excellent descriptions and general accuracy surpasses, in my opinion, nearly all the writers on these subjects, has rightly corrected Linnæus by not confounding the *Bovis* and *Equi*, but has unfortunately fallen into the error of considering the *Bovis* and the *hæmorrhoidalis* as the same. *Histoire des Insectes*, p. 297. *Genera et Species Insectorum*, p. 192.

* Since the above was committed to the press, Dr. Latham has informed me of a case related in the first volume of the Medical Communications, in which insects were removed from the *antrum maxillare* of a woman, and are evidently, as Dr. Latham has supposed, the *larvæ* of the *Œ. Bovis*.

In the *Fauna Etrusca* of Rôss, the *Bovis* is described “*alis maculatis*,” which must be the *Equi*; and a species under the name of *Equi* is described “*alis immaculatis*.” The *synonyma* are also mixed in a very extraordinary manner; tom. i. p. 268. In a subsequent volume he has proposed to reconcile these very various descriptions by referring them to a sexual difference.

In the *Entomologia* of Villers, the Linnæan account and references are copied, tom. iii. p. 345; and at the conclusion is very properly stated the perplexity attending the contradictory descriptions of these insects.

The references to Sultzzer and Frisch, as their figures afford no idea of the insect intended, I have omitted.

Modeer, in the Swedish language, *Af. Stockholm*. 1786, p. 125, has given *Equi* for *hæmorrhoidalis*, and *hæmorrhoidalis* for *Bovis*.

Geoffroy, *Histoire des Insectes*, in the three species described by him, has nearly followed the arrangement given by Linnæus, tom. ii. p. 445.

Fabricius, in his last work, the *Systema Entomologica Emendata*, has obscured this genus in a way that it will not be easy to unravel. He has given an *Oestrus Bovis*, with a description nearly corresponding to the true one, “*alis immaculatis*,” &c. but immediately refers to the Linnæan *Bovis* “*alis maculatis*,” and continues the Linnæan references. Under the title of *Equi* is described the *Œ. veterinus*, under which the *hæmorrhoidalis* is introduced as a variety β ! So that a description of the true *Œ. Equi*, the most frequent and strongly marked of this genus, is altogether omitted, as a distinct species; at the same time the variety of it β of my account and of the Linnæan *Fauna* is presented as a distinct species, under the extraordinary title of *Œ. Vituli*; and beneath it is a reference to the true *Equi* in Geoffroy. The *Œ. Pecorum* of this author is most probably a dark-coloured variety of the *Œ. veterinus*, or it may be altogether a new species.

The

The commission of errors like these, in a genus whose species had been more numerous, might have defied the possibility of detection, while the patient investigator might endeavour to understand them with unavailing labour.

Nor can I observe without regret, in this respectable work, such a direct abuse of the intention of *Synonyma*, which, far from assisting as auxiliaries to the description, which they ought always to do, serve only to perplex by their perfect disagreement.

Vallisneri has given in the Italian language a very extensive account of the *Œ. Bovis* and *Ovis*, with many curious quotations from the Italian poets and the ancients. Ragionamento intorno all' Estro de Buoi. *Opere*, tom. i. p. 225.

Reaumur has also been very copious in his account of the *Œ. Bovis* and *Ovis*, and has given a description of the *hæmorrhoidalis*, but appears not to have been acquainted with the *Œ. Equi*. *Histoire des Insectes*, tom. iv. p. 503.

OESTRUS. *Antennæ* articulis tribus, ultimo subgloboso setâ anticè instructo, in foveis duabus frontis demersæ.

Os apertura simplex, neque ullo modo exsertum.

Palpi duo, biarticulati, apice orbiculares in depressione oris utrinque siti*.

I. *Bovis.* *Œ.* alis immaculatis fuscis, abdomine fasciâ atrâ mediâ: apiceque pilis fulvo-flavis.

Vallisneri Opere, tom. i. tav. 28. f. 10. *Larva* 1, 2, et seq.

* Facies hujus generis muscarum omnino peculiaris est, lata, depressa, vesiculosa, glauca, et antennis in capite altè immerfis. Frons etiam faciem quadrupedis nonnihil simulat, præsertim *Simiæ*; hoc in *Œ. hæmorrhoidali* maximè conspicuum est.

Reaumur, Hist. Inf. tom. iv. p. 503. tab. 38. f. 7, 8.

De Geer, Hist. Inf. tom. vi. p. 297. pl. 15. fig. 22.

Schaeffer, Inf. Ratisbon. tab. 89. f. 7.

Fischer, Dissert. inaug. tab. 3. fig. 5.

Anglis, Breeze, Brize, or Gad-fly.

Habitat in pascuis, inter armenta, in quorum dorso deponit ova.

Descr. Œ. Equo vix major, fronte albâ, undique tomentosâ. *Thorax* anticè flavescens, in medio ater, lineis denudatis longitudinalibus quatuor, posticè cinerea. *Abdomen* basi cinereum fasciâ f. cingulo in medio atro, apiceque pilis fulvo-flavis. *Squamæ Halterum* magnæ niveæ convexæ. *Pedes* nigri, tarsis pallidis.

Fæminæ abdomen, stylo attenuato atro, compressione evolvendo.

Larva subcutanea, apoda, fusca, undecim segmentorum, lineis transversis, scabris, interruptis.

2. *Equi.*

Œ. alis albidis, fasciâ mediâ punctisque duobus nigris.

Œ. Bovis. Alis maculatis thorace flavo fasciâ fuscâ, abdomine flavo apice nigro. *Linn. Syst. Nat. p. 969. I. Faun. Suec. 1730.*

Œ. Bovis. Fabricii Species Insect. p. 398.

Œ. hæmorrhoidalis. Gmelin. Syst. Nat. p. 2810.

De Geer, Hist. Inf. p. 291. pl. 15. fig. 16.

Geoffroy, Hist. Inf. 2. p. 456. n. 3.

Habitat inter jumenta in pratis, deponit ova in genibus et lateribus equorum.

Descr. Frons alba, tomentosa, vertice fusco. *Oculi*

nigri, distantes. *Thorax* fuscus, in medio obscurior. *Abdomen* flavo-fuscum maculis punctisque incisurarum nigris. *Scutellum* fasciculis duobus pilosis. *Alæ* basin versus puncto minimo atro, fasciâ mediâ, apiceque maculis duabus nigris.

Mas flavo, fœmina fusco colore saturatior, apiceque abdominis elongatâ incurvatâ atrâ, stylo bifido terminali.

β *varietas*. Apice alarum maculâ unâ tantum oblongâ et abdomine tecto pilis densis, fusco-ferrugineis. Specimen vidi in Museo Linneano quod certè varietas β Faunæ Suec. 1730.

œ. *Vituli*. *Fabricii Syst. Ent.* 6. p. 231.

Larva teres, viridis, caudâ obtusè truncatâ, capite attenuato ore longitudinali corneo labiis duobus. Unguiculis duobus utrinque oris recurvatis atris. Marginibus segmentorum spinis rigidis deorsum spectantibus duplici serie obsitis. In ventriculo equorum nutrita, et ad maturitatem perducta, tandem ano emissa, in humum decedit.

3. *hæmorrhoidalis*. œ. Alis immaculatis fuscescentibus abdomine atro, basi albo apiceque fulvo.

œ. *hæmorrhoidalis*. Alis immaculatis thorace nigro: scutello pallido, abdomine nigro, basi albo apiceque fulvo. *Linn. Syst. Nat.* 2. 970. *Faun. Suec.* 1733.

œ. *Equi* β *Fabricii Syst. Ent.* 1. 6. p. 232.

œ. *Bovis*

Œ. Bovis. Gmelin. *Syst. Nat.* 4. p. 2809.

Reaumur, *Hist. Inf.* tab. 35. f. 3. *Larva*, t. 34.
fig. 14.

Geoffroy, *Hist. Inf.* 2. p. 455. n. 1.

Habitat in pascuis, deponit ova in labiis equorum.

Descr. *Œ.* Equo dimidio minor. *Frons* alba tomentosa. *Thorax* pilis fuscis spatio inter alas atro. *Abdomen* atrum basi albis apiceque pilis fulvis. *Subtus* pilosus, cinereus, femoribus nigris, pedibusque rufis.

Fœminæ abdomen apice elongatum, incurvatum, atrum.

β *variat* squama halterum majori lacteâ magnâ ac facie magis depressâ.

Larva minor aliter simillima priori.

4. *veterinus.*

Œ. ferrugineus alis immaculatis, lateribus thoracis, abdomineque basi pilis albis.

Œ. nasalis. Alis immaculatis, thorace ferrugineo, abdomine nigro pilis flavis. *Linn. Syst. Nat.* 969. 3. *Faun. Suec.* 1732.

Œ. Equi. *Fabricii Syst. Ent.* 6. p. 232.

Œ. nasalis. Gmelin. *Syst. Nat.* 4. 2811.

Habitat in pascuis. *Larva* in Equis aliisque veterinis.

Descr. *Œ.* Equo minor. *Caput, thorax, et abdomen* pilis ferrugineis tecta. *Alarum* ortus abdominisque basis pilis albis obsita. *Abdomen* quam in reliquis magis gibbosum segmento secundo



cundo tuberculis duobus hirtis. *Subtus* ferrugineo-fuscus—*Pedes* etiam ferrugineo-fusci.

β *Variat* præcipue fœmina abdomine pene atro.

5. *Ovis*.

œ. *Alis* pellucidis basi punctatis abdomine albo nigroque versicolore.

œ. *Ovis*. *Alis* subpunctatis abdomine albo nigroque versicolore. *Linn. Syst. Nat. p. 970. 5.*

œ. *Ovis*. *Fabricii Syst. Ent. 6. p. 232.*

œ. *Ovis*. *Gmel. Syst. Nat. p. 2811.*

Vallisneri Opere, tom. 1. tav. 27.

Reaumur, Hist. Inf. tab. 35. f. 22. Larva 8, 9.

Geoffroy, Hist. Inf. 2. p. 456. n. 2.

Habitat inter pecora; deponit ova in margine narium interiori.

Descr. œ. Equo minor, pilis scatentibus paucis, vertice capitis punctis excavatis. *Thorax* cinereus punctis elevatis atris, setigeris, lineisque quatuor nigris. *Abdomen* colore albido-cinereum nigro maculatum fugaci. *Supra* aperturam oris processu parvo conico.

Larva alba ovata, anticè acuminata unguiculis duobus, posticè truncata margine prominenti et squamulis duabus atris respiratoriis. *Supernè* convexa lineis punctisque nigris. *Subtus* plana in medio segmentorum punctis asperis atris minutis notata.

Habitat intra cavos frontis ovium, evaditque per nares.

XXVII. Characters of a new Genus of Plants named SALISBURIA.

By James Edward Smith, M.D. F.R.S. P.L.S.

Read December 6, 1796.

SALISBURIA.

MONOECIA Polyandria.

CHAR. GEN.

MASC. *Amentum* nudum, filiforme. *Antheræ* incumbentes, deltoideæ; loculis apice tantum connexis.

Fœm. solitarii. *Calyx* 4-fidus, persistens. *Drupa* supera, globosa, putamine triangulo. *Semen* albuminosum, bicotyledoneum.

SALISBURIA *adiantifolia*.

Ginkgo, vel Ginan, vulgo Idsio, arbor nucifera, folio adiantino.

Kæmpf. Am. Exot. 811, cum icone.

Ginkgo biloba. *Linn. Mant.* 313.

Ginkgo biloba, foliis Adianti. *Thunb. Fl. Jap.* 358.

DESCR. FRUCT. *Pericarpium*, *Drupa* pallidè fusca, supera, globosa; *caro* dura, crassa, putamini arctissimè cohærens; *putamen* tenue, osseum, ovale, triangulum, glabrum, apice acutum, uniloculare. *Semen* solitarium, ovale, basi angustatum, magnitudine ferè putaminis; *integumenta* duo, fusca, membranaceâ;

branacea; alterum putamini adhærens, alterum femini; albumen virescente-album, femini conforme, amygdalinum; embryo luteus, basi albuminis insertus, rectus, bicotyledoneus.

This is a large not inelegant tree, cultivated in China and Japan. The nuts are eatable, and sweet, but not produced till the tree arrives at a considerable age; nor has it been long enough in England to attain a sufficient degree of maturity. The male flowers however have been observed for these two years past, early in the spring, in Kew gardens. The tree itself has long been admired for its handsome fan-shaped leaves, cloven about half way from their summit; but they can by no means be termed *biloba*, or two-lobed, as that denomination requires the segments should be rounded. These leaves are also irregularly notched like those of the *Zamia*, thickened at the margin, smooth, striated on each side with numerous parallel nerves.

The genus is named in honour of *Richard Anthony Salisbury, Esq. F.R.S. and F.L.S.* of whose acuteness and indefatigable zeal in the service of botany no testimony is necessary in this society, nor in any place which his writings have reached.

Salisburia should be placed in the Linnæan system between *Quercus* and *Juglans*. In that of M. de Jussieu it belongs to the fifth order of his 15th class, after *Taxus*, though it is not very nearly allied to any genus whatever. I have preferred *adiantifolia* for a specific name, because *biloba* is not correct, and *adiantifolia* has not only been used long ago by Kæmpfer and Thunberg, but is peculiarly apposite in this case; my friend whose name I wish the plant in question to perpetuate, having distinguished himself by the application of such comparative specific names, and preferring them to all others.

The generic name of *Ginkgo*, being equally uncouth and barbarous, was retained by Linnæus in an Appendix, only till the flowers should be discovered, and the plant referred to its proper place in the System.

 XXVIII. EXTRACTS *from the* MINUTE BOOK *of the* Linnean Society.

July 2, 1794. **T**HE PRESIDENT communicated an account of *Mærops* *Apiaster*, the Bee-eater, having been shot (for the first time in Great Britain) near Mattishall in the county of Norfolk, by the Rev. Mr. George Smith. The identical specimen was exhibited, by permission of Mr. Thomas Talbot of Wymondham. A flight of about twenty was seen in June, and the same flight probably (much diminished in numbers) was observed passing over the same spot in October following.

Dec. 2. A specimen of *Tamarix gallica*, gathered in a wild state on St. Michael's Mount, Cornwall, by W. G. Maton, Esq. F.L.S. was presented to the Society.

June 2, 1795. Specimens of several rare native plants of Scotland, from Professor James Beattie, junior, of the Mareschal College, Aberdeen, were presented by the President, and among them *Linnaea borealis*, discovered by that gentleman, for the first time in Britain, in an old fir wood at Mearns near Aberdeen.

May 3, 1796. Mr. Fairbairn presented a living specimen of a *Ruscus*, which, though long cultivated in Chelsea garden, has been hitherto overlooked by botanists as a variety of the *aculeatus*. Being referred to the President for examination, it was returned with the following name and character :

RUSCUS

RUSCUS *laxus*.

Foliis ellipticis utrinque acutis mucronato-pungentibus supra floriferis nudis, ramis laxis.

The specific character of the common *Ruscus aculeatus* must be altered to

Foliis ovatis mucronato-pungentibus supra floriferis nudis, ramis strictis.

Jan. 3, 1797. The following extract of a letter from the Earl of Almont to A. B. Lambert, Esq. V.P.L.S. was read to the Society.

“ There were formerly in Ireland two kinds of wolf-dogs,
 “ the greyhound and the mastiff. Till within these two
 “ years I was possessed of both kinds, perfectly distinct and
 “ easily known from each other. The heads were not so
 “ sharp in the latter as in the former, but there seemed a
 “ great similarity of temper and disposition, both being
 “ harmless and indolent. The painting in your possession
 “ is of the mastiff wolf-dog. [See tab. 3, of the present
 “ volume.]

“ I have at present five wolf-dogs remaining, three males
 “ and two females; in these the two sorts appear to be
 “ mixed. The dam was of the mastiff, the sire, if I am not
 “ mistaken, was of the greyhound kind. The sire and dam
 “ had not dwindled in size from any that I remember here.
 “ Those which now remain are too young to judge of.
 “ We have an old man here, named Bryan Scabil, now in
 “ his 119th year, whose memory seems accurate, and all
 “ his faculties complete. He perfectly remembers the hunt-
 “ ing of wolves in Ireland, as a common matter of sport,
 “ and

“ and informs me that the usage was to collect all the dogs
“ of every sort in the neighbourhood, and to borrow wolf-
“ dogs from the principal gentlemen, who alone had them,
“ and who usually assisted in the chase. A tenth part of
“ the dogs used were not wolf-dogs, which never were in
“ any number in the hands of the common people. I con-
“ ceive also that these dogs having *no nose*, other kinds were
“ necessary to find the game and follow the scent of it.
“ Scahil described wolves with such perfect accuracy, I
“ have no doubt of his being well acquainted with the
“ animal.”

At the same time Mr. Lambert presented to the Society specimens of the new kind of Bark from Tecamez in South America (with a whole tree of the same), described by him in his Account of the Genus *Cinchona*, lately published.

April 4, Mr. Lambert exhibited a drawing of the *Ardea comata*,
1797. var. β , of Latham, shot at Boyton in Wiltshire, near a river, by Edmund Lambert, Esq. in the year 1775, supposed to be the only one of the kind ever found in England.

END OF THE THIRD VOLUME.