London for 1749; for, in the *first* edition of the *Species Plantarum*, published at Stockholm in 1753, we find *Phytolacca asiatica* for the first time noticed, with the following specific character, "*Phytolacca foliis serratis*;" and a reference made to the *Kalagu* of Rheede, (*Hort. Malab.* ii. *t.* 26.), which has a pinnate leaf, and is evidently nothing else than *Leea sambucina*. Linnæus appears to have been soon aware of his error, as in the subsequent editions of the *Species Plantarum*, the name is discontinued. My only object in this communication was to point out precisely the plant noticed by Captains Irby and Mangles. This object, I trust, I have satisfactorily fulfilled; but, as to attempting to ascertain the precise plant mentioned in the Sacred Scriptures, the difficulties that present themselves appear to me not to be lessened.

Addition to the Botanical Notices, published in No. XXVI. *of the Philosophical Journal, October* 1825.

In my article on the leaves used by the Chinese in lining tea-chests, there is some obscurity in the description of the nerves, which I think it necessary to remove. It seems as if I denied the existence of a midrib, but this I did not intend; for I meant to say, that the leaves agreed with the genus *Pharus*, and differed from most other *Gramineæ*, in the presence of a midrib, and that their straight parallel nerves, running longitudinally from the base to the apex of the leaf, distinguished them essentially from those of *Scitamineæ*, wherein the nerves arise laterally from the midrib, traversing the leaf in an obliquely transverse direction from the centre to the margin.

On the Structure and Characters of the Octopus ventricosus, Gr. (Sepia octopodia, Pent.), a rare species of Octopus from the Firth of Forth. By R. E. Grant, M. D., F. R. S. E., F. L. S., M. W. S., Fellow of the Royal College of Physicians of Edinburgh, Honorary Member of the Northern Institution, &c. Communicated by the Author *.

THE species of Octopus, of which I now present two specimens from the Firth of Forth, is of rare occurrence on our coasts,

* Read before the Wernerian Natural History Society 13th January 1827.

and is not to be found among the species of that animal described by Lamarck, nor among those described by Carus, as occurring in the Mediterranean. It possesses the characters of the genus Octopus of Lamarck, but differs from his *O. vulgaris* and *O. granulatus*, in having only a single in place of a double row of suckers on each arm. It differs from his *O. cirrhosus*, in having the upper margin of the mantle fixed behind, and continuous with the back of the head, in place of being free and detached all round. And it differs from his only other species, the *O. moschatus*, in being entirely free from that remarkable musky odour ascribed to that species by every author, and from which it has received its specific name. Pennant has pretty accurately represented our present species under the Linnæan name of Sepia octopodia, (Br. Zool. iv. pl. 28). But, from the description he has given, and from the name he has applied to it, it is obvious, that he was unaware of the existence of any other species of octopus, and mistook this for the *O. vulgaris*, which has a double range of suckers, and is much more common. The figure given by Carus of the *O. moschites* (Nova Acta Acad. Cæs. vol. xii. tab. 32.) agrees with Pennant's species in its external characters, excepting that the body of the moschites is a little more lengthened and cylindrical, the base more tapered, the eyes larger, and the arms more slender. But Carus mentions, that his species smells so strongly of musk as to fill quickly a whole apartment, whether the animal be dead or alive; and the same remarkable property is ascribed to it by Cuvier, Lamarck, and other writers. Aristotle, Aldrovandus, and some later authors, have divided the Octopoda into two genera, applying the term Eledona (Ελεδωνη Arist.) to those species, which, like the present, have only a single row of suckers on each arm; but this unnecessary subdivision of the well marked genus Octopus is probably not justified by the importance of the character proposed, and the most distinguished naturalists, as Cuvier, Lamarck, Blainville, and Carus, have not adopted it. As Pennant's species has neither the white skin, the smooth surface, the lengthened body, nor the musky odour of the *O. moschatus*, and differs, in more obvious characters, from the other species, we are compelled either to retain its specific name *octopodia* given by Pennant, or to devise a new epithet more con-

sistent with our present knowledge of these animals. It must be obvious, that the term *octopodia*, though very appropriate for one of the sepiæ of Linnæus and Pennant, cannot be applied to a species of Octopus without a plain tautology, and because the specific name, being then synonymous with the generic, would be equally applicable to all the species. Until a more determinate character, founded on structure, be discovered by a careful dissection of the other species, I have called the present species *O. ventricosus*, from the rounded appearance of the body in both the specimens I have seen, and in the figure of it represented by Pennant.

Many excellent details of the structure and habits of the Sepia, the Loligo, and the Octopus vulgaris have been given by Aristotle, Swammerdam, Monro *secundus*, Scarpa, Tilesius, and Cuvier; but, so far as I know, none of the species of octopus, with a single row of suckers, have yet been opened by anatomists. The O. ventricosus is the fifth species of cephalopodous animals I have already procured from the Firth of Forth, the other species being the *Octopus vulgaris*, *Loligo sagittata*, *Loligo vulgaris*, and *Loligo sepiola;* and it is interesting to observe, that these species are nearly all the same as those met with by Carus in the Mediterranean. That naturalist observed in the Gulf of Genoa, specimens of the Oct. vulgaris, Oct. moschatus, Loligo sagittata, L. sepiola, L. vulgaris, and Sepia officinalis.

The following observations are chiefly taken from a recent adult female specimen of the *O. ventricosus*, lately presented to me by my friend Mr Coldstream, and to abridge the anatomical details, I have compared its organs with those of the *O. vulgaris*, already fully described by Cuvier in his elaborate memoir on that animal, (*Mem. sur les Moll.* p. 1.)

The body of the *ventricosus* is short, broad, slightly depressed, rounded, and a little dilated posteriorly, granulated and deeply coloured with small reddish brown spots on the back, smooth and light coloured on the fore-part. The upper margin of the mantle is connected behind, across the whole breadth of the head, and has no lateral expansions to assist in swimming. In the other genera *Loligo* and *Sepia*, the mantle is free behind, and in these as well as in the *Loligopsis*, it is armed with lateral expansions to assist in swimming. These expansions are supplied in the *O. ventricosus* by the muscular web connecting the base of the arms. The funnel is long, narrow,

rather soft, and light coloured. The head is broad, short, covered with spots and minute granules on the back part like the body, white on the fore part with few spots. It expands without any previous contraction into eight strong arms, like an inverted cone. Pennant has represented a slight contraction of the head between the eyes and the arms. The eyes are very small, almost concealed under the folds of the skin forming the longitudinal eyelids, and they are placed rather towards the back than the sides of the head. The iris is white, has a shining silvery lustre, and is almost covered with small round spots of a deep reddish brown colour like those of the skin. The eight arms have all the same length, form and structure, but the two interior are much whiter than the others. The arms are about three times the length of the body, much compressed throughout their whole length, very strong at their base, and tapering regularly to almost imperceptible filaments at their free ends. They are deeply spotted externally, nearly white on their central aspect, and are armed with a single range of suckers on their inner surface, extending from their base to their extreme points. The bases of the arms are connected to each other, by a strong muscular web spotted externally, and white within, like the arms, and extending between the arms to about the twelfth sucker from the mouth. The suckers commence about half an inch from the fringed lip of the mouth; they are sessile, broad, and very short. The suckers next the mouth are nearly a line in breadth, they increase regularly in size to the sixth from the base which is the largest on all the arms, and measures nearly three quarters of an inch in diameter. From the sixth sucker they again diminish regularly in size, till they become quite invisible to the naked eye near the points of the arms. With a lens they may be counted to within half a line from the points, and about 111 are found on each arm, making 888 on the animal. The first four suckers from the base, are about two lines distant from each other, the rest are placed in close contact. In the *O. vulgaris* the first three or four suckers from the mouth are likewise placed in a single row, and a little distant from each other, but from these to the points of the arms there is a double range; in that species there are about 240 on each arm, making in all 1920. In the *O. granulatus*, Cuvier states that there are 180 suckers (90 pairs) on each arm, making 1440 suckers on that species. It might be useful to observe this external character in all the species. Each sucker of the ventricosus consists of a central cartilaginous hemispherical cup, surrounded by a very broad flat muscular margin, which is deeply marked like the inner edge of the cup, with from fifteen to seventeen distinct radiating grooves. Cuvier has made no mention of these thick white, firm cartilaginous cups, in describing the suckers of the *O. vulgaris*. They can be taken out entire with great ease from the centre of the suckers, particularly after immersing them in boiling water. There is no horny circle nor sharp converging teeth within these cups, as we find in the pedunculated suckers of the *Sepia* and *Loligo*.

The external dimensions of the adult animal are—from the upper margin of the mantle to the lower end of the body 4½ inches; greatest breadth of the body from right to left 3½ inches; length of the

arms from the mouth 12 inches; extent of the muscular web between the arms 3 inches; breadth of the web between each pair of arms 4 inches; breadth of the head at the eyes $2\frac{1}{4}$ inches; external aperture of the eyelids when expanded into a circle only $\frac{1}{4}$th of an inch. The coloured spots of the skin are of a deep reddish brown colour. In the *cirrhosus*, Lamarck states that they are of a bluish grey colour. In the *O. vulgaris* they are brown. Lamarck states that the whole skin of the *moschatus* is white, but Carus has represented it spotted with red. In the *ventricosus* they are so minute and crowded together on the back, as to be almost undistinguishable without a lens; the largest are about the tenth of a line in diameter, and between these are crowded others infinitely smaller. On the fore parts of the body they are few, and placed at greater distances from each other. The colour is of different intensity in different spots, and even in different parts of the same spot. They are confined to a thin layer on the outer surface of the true skin, which may be compared to the rete mucosum of the higher animals. When a part of the surface is plunged into boiling water, the coloured superficial film is easily removed. In the living state, the spots appear and disappear in rapid succession, as in other cephalopodous animals. In a young specimen of the *ventricosus* only about 4 inches in total length (now in the Museum of the University), which I kept alive for some hours in a basin of sea water, I observed, that, when the surface of the body was touched with the finger, the neighbouring parts quickly and rapidly changed colour, clouds of a bright red colour spread rapidly in every direction over the surface, from the part touched. This diffused redness, which was like a blush on the human skin, appeared to be produced by some coloured fluid passing repeatedly to and from minute vesicles on the surface of the skin. The animal swam several times hurriedly across the basin, always with its posterior extremity forward, by repeatedly striking forward the whole of its webbed arms at the same instant. Swimming seemed as unnatural to it, as to a pea-crab, which likewise swims hurriedly backward by striking the water with its tail, or to many bivalve mollusca, which swim backward by flapping their shells. It likewise climbed up the sides of the basin, out of the water, by spreading its arms in every direction, fixing its tender suckers to the sides of the vessel, and carrying the posterior part of its body erect. The granules on the back parts of the adult animal are about the size of a grain of sand, situate in the true skin, and are seen on the mantle, head, arms and webs. The *O. granulatus* is distinguished by these tubercles or granules of the skin, but they are not confined to that species, and Lamarck suspects that it may be only a variety of the *vulgaris*. There is still a necessity for minuter observations than we at present possess, for the accurate discrimination of these singular and interesting animals.

The cartilaginous frame-work of the head is very soft and transparent: it forms rather small orbits, very large spherical cavities for the ears, and a small recess between these two shut cavities for lodging the ganglion of the œsophagus, compared to the brain of vertebral animals. In place of the osseous or cartilaginous plates extending down the back of the mantle in the other genera, we find two small cylindrical stiliform cartilages, about the thickness of a crow

quill, extending down the sides of the lower half of the mantle. These bodies are thickest where they commence at the bottom of the branchiæ, and become quite filiform as they descend in a curved direction to near the base of the mantle. They are not connected with the muscular fibres of the mantle, as might be expected, but are placed in distinct cavities. On clipping open the capsules which contained them, they fell out in loose transparent fragments of an amber-colour. The muscular system presents nothing peculiar. The fleshy membranes within the sac immediately enveloping the viscera, are comparatively strong. Cuvier states that the fringed lip in the *O. vulgaris* is only a fold of the skin (*Mem.* p. 25.) On laying open the lip in the *ventricosus*, a strong sphincter muscle is seen surrounding its upper margin, and very delicate muscular bands descend from the sphincter to the sides of the bills. Strong muscular bands are seen passing from arm to arm across the connecting webs; and within these a thin layer of muscular fibres extends longitudinally to the free margin of the webs. The whole convex outer margin of the cartilaginous cups of the suckers is covered with the insertions of oblique muscular bands for the varied motions of these organs; and a distinct set arises from the margin of the cups, radiating outward to assist the external bands in moving the broad disk of the suckers. The muscular structure of the arms, the mantle, the funnel, the bands connecting these, and the fleshy peritoneal coverings, is the same as described by Cuvier in the *O. vulgaris*. On laying open these peritoneal coverings, we observe the great length of the glandular-like bodies attached to the superior and inferior trunks of the veins leading to the lateral hearts. When the parts are floating loosely in water, these singular glands extend nearly half an inch from the sides of the veins, and appear as empty white pear-shaped sacs, attached by their tapering ends to the coats of the veins. In place of these long pear-shaped bodies, we find in the *Loligo sagittata* only a thick soft sponginess of the coats of the veins, which, however, is of the same glandular nature, and secretes a thick white fluid, whose use is entirely unknown. The fluid which escapes by pressing these glands is always more thick and turbid than the blood which we find circulating in the bloodvessels. On cutting open a living *L. sagittata*, these glandular parts of the veins exhibit a remarkable peristaltic motion, which continues as long as any other motions of the body. The two branchial hearts have the same remarkable blackish-grey colour as in the *O. vulgaris*, which is probably peculiar to this genus. Those of the *L. sagittata* have always a pale-red colour. In the *ventricosus*, these organs are pretty large, destitute of the white appendices we find in the *L. sagittata*, dark-coloured through their whole texture, and deeply marked internally with columnæ carneæ, which form innumerable small pits in the parietes. The branchiæ, about 2¼ inches long, and pretty broad, are immediately connected with a thick fleshy band, which hangs by a thin fibrous membrane to the sides of the mantle; and along the thick margin of this fleshy band the branchial artery is firmly connected, from the lateral heart to the upper end of the gill on each side. They are ramified in the same manner as in the *vulgaris*, and they suffered an injection of

size and vermilion to pass with great ease both through the vein and the artery. I have often found the vein burst in the *L. sagittata* in forcing the same injection through that vessel, in a direction contrary to the natural course of the blood. The central heart has very thin white firm walls, slightly marked internally with columnæ carneæ; and its capacity is more than three times that of each lateral heart. The distribution of the arteries and veins, as might be expected, was similar to that of the *vulgaris*, so far as I could trace them.

The white fringed lip surrounding the two bills is rather short; the bills, of a deep brown colour, are likewise short and powerful; the lower one is much expanded at its base. The tongue is covered with an amber-coloured hard, horny, membrane, which has several longitudinal rows of sharp reflected teeth. The upper pair of salivary glands are round, flat, deeply lobed on the margins, of a white colour, bound to the fleshy sides of the mouth, and they send their ducts through these fleshy parietes into the mouth. By remaining some weeks in spirits, these glands acquired a purple colour, while the lower pair, equally exposed, were not affected. The lower pair of salivary glands are of a pale-red colour, about an inch long, and three quarters of an inch broad, compressed, smooth, not lobed like those of the *vulgaris*, firm in texture, somewhat triangular or heart-shaped, and they are loosely suspended behind the upper margin of the liver, by means of their vessels, nerves, and ducts. On cutting open these large compact glands, we find a small cavity, like the pelvis of a kidney, at their upper part, from which the ducts commence. They are about ten times as large as the upper pair. Their two ducts unite into one, which passes up on the fore part of the œsophagus for nearly two inches, to enter the mouth at the root of the tongue. When the œsophagus reaches the upper and back part of the liver, it becomes firmly connected to that organ, and expands into a wide membranous crop, deeply marked internally with longitudinal folds, and covered with a villous appearance. The part of the crop which is most intimately connected with the substance of the liver is drawn upwards in the form of a cœcum, and has a glandular texture. The crop tapers as it descends obliquely to the gizzard. This membranous crop is not present in the *Loligo sagittata*, where the œsophagus passes without dilatation to the stomach, at the bottom of the liver, next to the spinal sac. The muscular sides of the gizzard are of great thickness, and as strong in proportion as those of a domestic fowl. Its two fleshy sides are placed nearer the upper than the lower end; the under end is thin and membranous. The hard cartilaginous lining of the gizzard I found quite detached from the sides; and, on examining its contents carefully in a watch-glass, I collected some undigested muscular parts of a pale-red colour, fragments of the crustaceous covering and joints of young crabs, and some coarse particles of sand. I have no doubt, from the appearance of these parts through the microscope, that the particles of sand aided in the comminution of the hard shells. In the *L. sagittata* there is only a thin, wide, membranous stomach in the place of this thick fleshy gizzard. The upper and left side of the gizzard opens into the spiral stomach, which has nothing peculiar. The large intestine, on leaving the spiral

stomach, makes a long curve downwards behind the left branchial heart, like another cœcum, before it mounts upwards on the fore part of the liver, to terminate at the base of the funnel. The liver is short, spherical, of the usual orange-yellow colour, composed of the ramifications of vessels filled with a coloured fluid. In the *O. vulgaris* it is cylindrical, from the greater length of the body ; and, for the same reason, it is very long and cylindrical in the *L. sagittata*. Its canals are not surrounded by the pancreatic glands, which I have shewn, in the *L. sagittata*, to embrace and communicate with these ducts during their whole passage from the liver to the spiral stomach, and which were mistaken for the ovarium at a period when the structure of these animals was very little known, (*See Edin. Phil. Journ.*, vol. xiii. p. 197). The want of these glands in the *O. ventricosus* is compensated for by the very large inferior pair of salivary glands. The ink-bag is deeply imbedded and nearly concealed in the substance of the liver, but it sends out its excretory duct from the lower and fore part of that organ, to terminate as usual in the anus. The colour of the ink is quite different from that of the *L. sagittata ;* and as the colour of this substance is constant in each of the cephalopodous animals, a more intimate acquaintance with this character might be useful in tracing relations among the different species. The colour of the ink in the *L. sagittata* is a deep brown, approaching to yellowish-brown, when much diluted, and corresponds remarkably with the coloured spots on the skin of that species. In the *O. ventricosus*, the colour of the ink is pure black, and is blackish-grey when diluted on paper. The ink, brought in a solid state from China, has the same pure black colour as in the *ventricosus,* and differs entirely in its shade, when diluted, from that of the *L. sagittata*, as may be seen from specimens of these three colours on drawing-paper. Swammerdam suspected the China ink to be made from that of the *Sepia*, Cuvier found it more like that of the *Octopus* and *Loligo ;* but different kinds of that substance are brought from China, probably made from different genera of these animals, where they abound of gigantic size. Ink is at present made from these animals in Italy (*Cuv. Mem.* p. 4), and from the immense shoals of the *L. sagittata* cast ashore every spring in the Firth of Forth, it might likewise be manufactured here. The ink is not contained in a simple cavity attached to the liver, but is diffused through a soft cellular substance which fills the ink-bag, and must render more tedious the preparation of this substance for the arts.

The œsophageal ganglia, compared to the brain and cerebellum of vertebral animals, were small, white, soft, without internal cavities, lodged in open recesses of the cartilaginous ring surrounding the œsophagus, and were separated from the œsophagus only by a thin transparent membrane, to which they firmly adhered. The large reniform optic ganglia, the band of nerves proceeding from these to the retina, the white pulpy glandular masses within the back part of the sclerotic, the division of the lens, and the general structure of the eye, are the same as in the *vulgaris*. At the bottom of the large shut spherical cavities of the ears, which were capable of containing a garden pea, lay a very delicate membranous sac, containing a little fluid,

and a small red-coloured stone shaped like a limpet, the only earthy matter in this animal. These small bones of the ear are conical, solid, of a rose-red colour on the sides, flat and white on the base; their apex is rounded and curved backward, their length, breadth, and height, are about half a line. When cut, they appear white and translucent within, like the inner layers of an oyster shell; they are very slightly excavated in the centre of their flat base, and they dissolve with effervescence when touched with nitric acid, like other substances composed of carbonate of lime. The great nervous trunk accompanying the small artery in the central tube of the arms, the great ganglion, with about twenty nerves radiating from it, placed within the upper and back part of the mantle, and the other nerves and ganglia, were very conspicuous, and corresponded in distribution to those of the *vulgaris*.

The specimen I dissected was a female, and the ovarium, consisting of beautiful detached ramified trunks, enclosed in a wide membranous sac, occupied the lowest part of the general cavity of the body, as in the other cephalopodous animals. The ova, instead of being attached by their peduncles to a single point, as in the *vulgaris (See Cuv. Mem. p.* 31.), were attached to the extreme ramifications of about twenty branched trunks, which hung by separate stalks from the upper end of the membranous sac. The two reniform glands through which the oviducts pass, and which very probably secret the coverings of the ova, as in the skate and other fishes, and connect them together, were about the size of a pea, of the same dark colour as the lateral hearts, and were placed about half an inch from the lower end of the oviducts. The oviducts opened on each side about half way between the lateral hearts and the anus.

Meteorological Observations made in Jamaica by the late John Lindsay, *Esq. Surgeon, Jamaica.* Communicated by W. C. Trevelyan, Esq. M. W. S. &c.

The author of the following Tables is well known to the public. He published an account of the Epidemic Catarrh of the latter end of the year 1789, as it appeared in Jamaica, in Med. Com. vol. xvii. p. 499, 1792. Also, an account of the Germination and Raising of Ferns from Seed, Trans. Lin. Soc. vol. xi. p. 93, 1792; of the Quassia Polygama, or Bitter Wood of Jamaica; and, of the Cinchona brachycarpa, a new species of Jesuit's Bark, found in the same island, Trans. Soc. Edin. vol. iii. p. 205, 1794.