by distention, from water, and the contraction of their own muscular parietes. The spines are moved principally, we think, by means of the exterior irritable skin which covers the shell and envelopes their bases ; but when these spines are very large, the tubercle to which they are articulated is perforated for the transmission of muscular fibres from within, and which appear to be inserted into their roots by a coronet of fibres.@@1 The number of spines and suckers,— and let it be remembered that there are several muscles to every spine and every sucker,—on a single individual, is indeed wonderful. A specimen of Echinus esculentus, of moderate size, will have at least 160 primary prickles on each of the large, and 80 on each of the small areæ ; that is, 1200 in all ; but reckoning the lesser bristles, there will not be fewer than 3000: and there cannot be less than 100 suctorial tubes in each ambulacrum, making the num­ber of exterior appendages in this creature 4000. We join in the conclusion of Baster : “ Quod si jam musculorum, ad aculeorum et proboscidum motum necessariorum copiam animo concipiamus, Omnipotentem, quæ hæc animalia creavit, sapientiam attoniti et venerabundi adoremus, necesse est.”@@2

The seas of warm and tropical countries are the most productive in Echinides ; but the living species are few com­pared with the fossil, which are found principally in the chalk and oolite formations, in such abundance, and in so fine a state of preservation, that they are common and fa­vourite objects in collections. Desmoulins has, in the fol­lowing table, which, although incomplete, is interesting, exhibited the proportions which the extinct bear to the still existing species.

|  |  |  |
| --- | --- | --- |
| **Clypeastre .** | **....Total No. 13** | **of which are living 6** |
| **Scutella** | **35** | **21** |
| **Fibularia.** | **17** | **9** |
| **Cassidula** | **.5** | **0** |
| **Galerites** | **10** | **1** |
| **Pyrine** | **7** | **0** |
| **Echinometra....** | **6** | **6** |
| **Diadema** | **14** | **7** |
| **Cillantes** | **28** | **12** |
| **Echinonde** | **2** | **2** |
| **Echinolampe....** | **28** | **3** |
| **Nucleolite** | **22** | **1** |
| **Collyrite** | **11** | **0** |
| **11** | **0** |
| **Ananchvte** |
| **Spatangus.** | **57** | **18**@@**3** |

The direct uses of the Echinides to man are few and trivial. As its name indicates, the Echinus *esculentus* is eaten in some parts of the south of Europe ; Pennant says, “ by the poor in many parts of England, and by the better sort abroad.” They are in season in spring, when the ova are most developed, and nearly fill the shell. They are re­corded as among the favourite dishes of the Greeks and Ro­mans. “ They were dressed with vinegar, honied wine or mead, parsley, and mint; and esteemed to agree with the stomach. They are the first dish in the famous supper of Lentullus, when he was made *Flamen Martialis,* priest of Mars. By some of the concomitant dishes, they seemed designed as a whet for the second course, to the holy per­sonages, priests, and vestals invited on the occasion.” Epicharmus describes them as used likewise at the marriage feast of Hebe : “ Thither came crabs and urchins, unable to swim in the sea, but travelling only on the ground.” In the Wasps of Aristophanes, the old dicast, who is the hero of the piece, repeats a fable respecting an urchin, who, when his shell had been cracked by a woman, summoned witnesses to prove the assault. He is interrupted by the remark, that it would have been much wiser for the creature to buy a bandage. Ennius, in his Phagetica, mentions “ dulces echini,” and “ calvaria pinguia,” the latter evidently a spe­cies of Spatangus, which, we also know from Aristopha­nes, was considered a very dainty morsel. The Echinus is several times mentioned in Horace as good eating. The shells, cleaned and bleached, are pretty ornaments, with which finical idlers dress up their moss or summer houses, and naturalists their museums. Some fossil species are called fairy-stones, their spines elves’ spurs ; and with these names were once associated, as we learn from Sir Thomas Browne, suitable and terrible apprehensions, as well as medicinal virtues ; “ common opinion commendeth them for the stone, but are most practically used against films in horses’ eyes.”@@4 Once only has an Echinus been truly beneficial to our race. Some species of the genus Cidaris, we may observe, have very large prickles. The heathen children of the island of Rarotonga, in the South Seas, converted to Christianity by English missionaries, were in want of pencils with which they might be taught to write on slates ; for these "they went into the sea, and procured a number of the Echinus, or sea-egg, which is armed with twenty or thirty spines. These they burnt slightly to render them soft, that they might not scratch ; and with these flakes of stone for a slate, and the spine of the sea-egg for a pencil, they wrote exceedingly well ; and hundreds of them took down the principal portions of every discourse they heard.’’@@5

We now proceed to give an analysis of a few of the modern me­thods of classification proposed for the Echinides. Linnæus, keep­ing his eye fixed on the recent species only, of which he knew no more than seventeen, reduced them all under one genus, believing, probably, that all previous attempts were premature ; for he could scarcely regard the differences on which certain groups were pre­viously grounded, as unimportant, or uninfluential over the habits of the animals. Müller did no more than give a name to the Linnæan sections, which were two, founded on the central or ec­centric position of the anus ;@@® and the Linnæan simplicity was praised and followed until the views of Cuvier, and the system of Lamarck, freed us from the thraldom of the great Swede, and ge­nerated a new spirit, too little regardless, perhaps, of authority, and too prompt to invent and promulgate novel plans, which have had however one good result, in bringing before us prominently and distinctly, structural peculiarities which were previously hid or disregarded amid the vagueness of the Linnæan generalities. The system of Lamarck is exhibited in the following table :

|  |  |
| --- | --- |
| 1. The vent below the margin, in the lower surface, or in the margin. | |
|
| \**The mouth beneath, always central.* | |
| Scutella, Clypeaster, Fibularia, | Ambulacra contracted. |
| Echinonius, Galerites, | Ambulacra complete. |
| \*\**The mouth beneath, not central, but approaching to the margin.*  Ananchites. Spatangus. | |
| 2. The vent above the margin, and consequently dorsal. | |
| \**The vent dorsal, but approaching to the margin*.  Cassidulus. Nucleolites.  \*\**The vent dorsal and vertical; the shell regular.*  Echinus. Cidarites.@@7 | |

*@@@*, See Kirby’s *Bridgew. Treatise,* p. 207. the largest spine of an Echinus on record is that noticed by Mr Gray, “ nearly an inch and half in circumference, and more than eight inches long.” *Ann. of Nat. Hist.* i. p. 414.

*@@@8 Opusc. Subt.* i. iii. p. 113. Professor Grant says, “ there are more than 10,000 pieces in the shell of the Echinus esculentus, without counting the complicated dental apparatus of the mouth, or the respiratory and ovarial plates, or the very minute calcareous pieces disposed irregularly on the coriaceous membrane around the oral and the anal orifices.”—*Outl. of Comp. Anat.* p. 20.

*@@@3 Ann. det Sc. Nat.* n. s. v. p. 234. See some interesting tables, of a somewhat similar description, by Mr Taylor, in the *Mag. of Nat. History,* iii. p. 277.

*@@@4 Vulgar Errors,* p. 71.

*@@@*4 Williams’s *Missionary Enterprises,* p, 409.

*@@@*β Echinus.—“ \* Regulares: ano verticali. \*\* Irregulares : apertura ani subtus uti os.” *Syst. Nat.* p. 1102 and 1104.

*@@@7 Hist. Nat. da Anim. sans Vert.* iii. p. 6. We have used Mr Parkinson’s translation. *Org. Remains,* p. 119.