shift their position so that in individuals 5 mm long their inner openings are located on the dorsal surface of each gonad sac near its posterior end and close to the mid line. Before the complete establishment of these relations the cells lining these canals develope a heavy ciliated coat, and in those species which possess glandular enlargements (mucous or albumen glands erroneously termed uteri) signs of glandular activity make their appearance. It thus follows that in specimens not over 7 mm long the reproductive system is definitely established with relations practically as in the adult, the chief difference being the definite paired nature of the gonad.

In *Nuttalochiton hyadesi* and in *Acanthopleura echinata* (l. c. p. 113) Plate has found that the gonad even in comparatively large animals has no connection with the gonoducts and since these last named tubes are usually sharply differentiated into an inner glandular and an outer non glandular, ciliated section he considers it probable that they have different origins, the distal portion arising as an ectodermic invagination while the glandular is a product of the gonad. As noted above not less than twelve species of chitons examined on this point give no evidence of this double origin for in its early development the gonoduct is a tube of like appearance throughout, being of even calibre and ciliated. Hence I believe that where it is separated from the gonad until a late period in life it is to be looked upon as a very highly modified condition.

6. Note on Eremicaster, a Genus of Starfishes.

By Walter K. Fisher, Stanford University, California.

eingeg. 11. Mai 1907.

In 1905 (Bull. Bureau Fisheries, XXIV, p. 293) I described *Eremicaster* as a subgenus of *Porcellanaster*, with *tenebrarius* as type. Recently (Zool. Anz. 1907 p. 317) Prof. Ludwig raised this to the rank of a genus and changed the type to *Porcellanaster crassus* Sladen. In the genus he includes the following species: *crassus* Sladen, *gracilis* Sladen, *tenebrarius* Fisher, and *waltharii* Ludwig. In *Porcellanaster* s. str. are placed: *caeruleus* Wyv. Thom., *caulifer* Sladen, *tuberosus* Sladen, *granulosus* Perrier, *inermis* Perrier, *pacificus* Ludwig, *vicinus* Ludwig.

Ludwig rightly contends that the three characters mentioned by me — the presence of 3 cribriform organs, segmental pits and papillae, and 1 or 2 adambulacral spinelets — occur independently in the wider genus *Porcellanaster*. The last two characters have not the importance I supposed in 1905, for a species has since been described — *P. pacificus* Ludwig — which has 3 cribriform organs but no segmental pa-

pillae; and either 1 or 2 adambulacral spinelets may occur in the same species (e. g., *tenebrarius*). I do not agree with Ludwig who considers the segmental papillae as of primary importance in dividing *Porcellanaster*, and the cribriform organs as of no importance. The latter are absolutely constant, while the segmental papillae are variable in number. From an examination of 51 specimens of *E. tenebrarius* it is evident that the range of variation is much greater than I supposed in 1905 where I had only 6 specimens. For instance, while there are always 3 cribriform organs, the number of segmental papillae, that are easily recognized as such, ranges from about 5 to 15 on either side of a furrow. The superomarginal spines are often entirely lacking, or may be absent from first 2 or 3 plates, or scaltered here and there almy ray. The segmental papilla on outer part of ray is transformed into an ordinary spinelet; and it is evident that the segmental papilla of *Eremicaster* and the aboral adambulacral spinelet of *Porcellanaster* are homologous structures. Consequently the outer part of the ray in typical *Eremicaster* has the same adambulacral armature as the whole ray of *Porcellanaster*. It is but a slight step to the total disappearance of segmental papillae in *Eremicaster pacificus* (Ludwig). The extent of the »outer part of the ray« varies considerably in different specimens for it is not always evident where a papilla ceases to be such and become a spinelet. I have examined specimens of *pacificus* (which lacke segmental papillae but has 3 cribriform organs) and the species appears to be much more closely related to *E. tenebrarius* than to *P. caeruleus*. The reverse would naturally be true if the species belongs in *Porcellanaster*.

I have carefully compared the figures and description of *Eremicaster waltharii* (Ludwig) with my *E. tenebrarius*. I have no doubt that they are the same species, for the only tangible difference — the presence of 2 adambulacral spinelets in *tenebrarius* — is not constant, many specimens having either 1 or 2, or only 1. In fact there is more difference between the extremes of 45 specimens from a single station off southern Alaska than exists between typical *tenebrarius* from California and *waltharii* of the Panama region. The former name has about a mouth priority. The range of *E. tenebrarius* is thus southern Alaska to the Galapagos Islands, and 1569 to 2259 fathoms.

Eremicaster pacificus is found in Bering Sea, south of the Pribilof Islands, in 1771 fathoms. Its range is Bering Sea to the equator, in the eastern Pacific.

In raising *Eremicaster* to the rank of a genus Prof. Ludwig, curiously enough, changed the type (*tenebrarius*) to *crassus* Sladen. This is contrary to a fixed law in nomenclature. *Eremicaster* whether genus or subgenus, will stand or fall with *tenebrarius* as type. The two species

are, however so close together that it makes no material difference which is type; but the habit of loose methods in nomenclature and the ignoring of well established rules can not be too strongly condemned.

The two genera should stand:

1) *Porcellanaster* Wyv. Thom. 1877. — Type, *P. caeruleus*. Includes the species mentioned by Ludwig minus *pacificus* and *vicinus*.

2) *Eremicaster* (Fisher), 1905. — Type, *E. tenebrarius*. Differs from *Porcellanaster* s. str. in having 3 cribriform organs, and sometimes segmental pits and papillae. Includes: *tenebrarius* Fisher, *crassus* Sladen, *gracilis*[1] Sladen, *pacificus* Ludwig, *vicinus* Ludwig.

7. Distruzione e Rigenerazione degli Aculei e Pedicellarie negli Echini.

Dott. O. Poso, Stazione zoologica Napoli.

eingeg. 15. Mai 1907.

Il dottor Lo Bianco, mettendo a mia disposizione due esemplari di *Sphaerechinus granularis*, pescati qualche tempo dopo l'eruzione del Vesuvio (aprile 1906), mi esprimeva il dubbio che i giovani e delicati aculei, dato lo sviluppo completo degli animali, si dovessero considerare come neoformazioni: tali infatti essi apparivano dietro esame comparato con aculei d'individui adulti normali. Che la cenere fosse stato il fattore determinante la caduta degli aculei non era da metterlo in dubbio: Lo Bianco afferma di aver pescato, subito dopo la pioggia di cenere, ricci ridotti »al solo dermascheletro, senza traccia di spine«. Rimaneva però alla ricerca sperimentale l'affermare che gli animali avessero avuto tale energia vitale da resistere all' azione deleteria della cenere e da rigenerare le parti perdute del loro scheletro. La letteratura sugli Echinodermi, per quanto estesa, non contiene nessuna notizia relativa a tale argomento.

Nella Stazione Zoologica di Napoli, con materiale relativamente abbondante, data la scarsezza di ricci, dovuta a detta eruzione, ho iniziato una serie di esperienze intese appunto ad affermare il fenomeno della rigenerazione.

La distruzione completa degli Echini inregolari, non è stato possibile avere neppure un *Echinocardium mediterraneum* così comune nel nostro golfo, non mi ha permesso di estendere le ricerche su esemplari di entrambe le divisioni degli Echini; mi sono quindi limitata ai soli generi: *Sphaerechinus granularis*, *Echinus microtuberculatis* e *Strongylocentrotus lividus*, che con più facilità ho avuto a mia disposizione.

[1] Probably young of *crassus*, as very small *tenebrarius* usually present analogous characters. That is, young of *tenebrarius* differ from adults in the same way that *gracilis* differs from *crassus*. Sladen seems to have had only 1 specimen of each form.