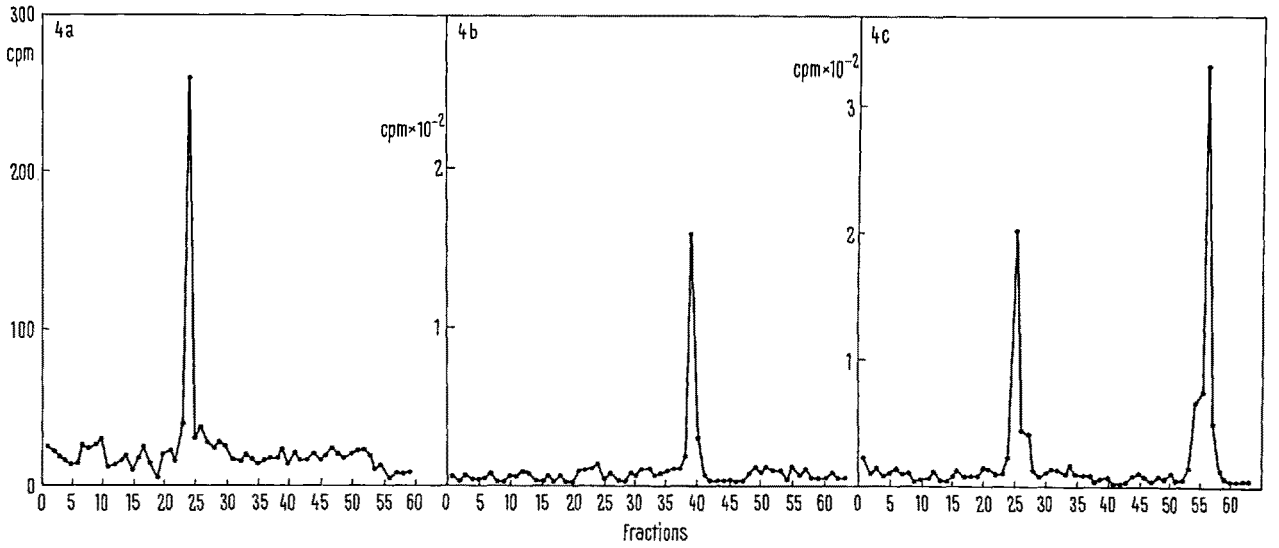


Fig. 3. Electrophoretograms of gradient fractions shown in Figure 2 that band at $\varrho$ = 1.43 g/cm³ (a), $\varrho$ = 1.18 g/cm³ (b) and $\varrho$ = 1.33 g/cm³ (c). Conditions of electrophoresis as in Figure 1.

hemagglutinin bands at $\varrho$ = 1.18 g/cm³, and viral cores band at $\varrho$ = 1.33 g/cm³. Intact virions have the buoyant density of 1.24 g/cm³ (ref. [5]).

The gradient fractions were collected, solubilized and studied by means of polyacrylamide gel electrophoresis. The results are shown in Figure 3. It is seen that the protein of the internal component of VEE virus is identical with the first major protein shown in Figure 1. The protein of virus hemagglutinin is identical with the second major protein of the virus. Virus cores contain 2 proteins, one of which is identified as the protein bound with viral RNA and the other as the protein of the inner membrane (the third major protein of the virus).

To evaluate the molecular weights of 3 proteins of VEE virions, experiments were conducted in which coelectrophoresis of VEE proteins was carried out with several protein markers of known molecular weight. We selected for this purpose bovine serum albumin (mol. wt. 69,000), trypsin (mol. wt. 24,000), pancreatic ribonuclease (mol. wt. 13,000).

Based on these data, the molecular weights were estimated as 59,000–61,000 daltons for the protein of nucleocapsid, 34,000–38,000 daltons for the protein of hemagglutinin, and 15,000–18,000 daltons for the protein of the inner membrane.

ВЫВОДЫ. Для исследования белков вирионов венесуэльского энцефаломиелита лошадей была применена комбинация методов разделения субвирусных компонентов в градиенте хлористого цезия и электрофореза в полиакриламидном геле. Этими методами обнаружено три белка: белок нуклеокапсида (мол. вес. 59,000–61,000 дальтонов), белок гемагглютинина (34,000–38,000) и белок базальной мембраны (15,000–18,000).

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## Thelytochous Parthenogenesis in *Cereus pedunculatus* (Actiniaria)

A dense population of *Cereus pedunculatus* lives in the Leghorn aquarium where numerous individuals cover the drain channels, the walls and the bottom pebbles of the best illuminated tanks. No samples of this species have hitherto been found either along the coast of Leghorn or in the shallow banks of the Meloria, despite close investigation.

The Aquarium population is represented by individuals which never reach big sizes (maximum height 20–30 mm); the mean number of tentacles is 235 with a minimum of 104 and a maximum of 345 in normally developed individuals. This species is said to reach 90 mm in height and tentacles often excede 700 in number (Stephenson[1], Andres[2]).

*Cereus pedunculatus* is known as a hermaphrodite species (Leloup[3], Pax and Müller[4]) and is normally viviparous (Stephenson[1]). Specimens from the population of the Aquarium tanks have been examined in order to investigate the reproductive and sexual condition of the population.

Samples have regularly been taken from the tanks at two month intervals: some of them have been fixed for

histological investigation and some were taken into culture containers which were kept at a constant temperature of 18 °C under natural illumination.

Collections and observations were started in November 1967 and are still going on. All the individuals that were histologically examined so far at any season of the year were females. No traces either of spermatozoa or of spermatogenetic processes were ever found in the numerous samples which were fixed and thoroughly examined.

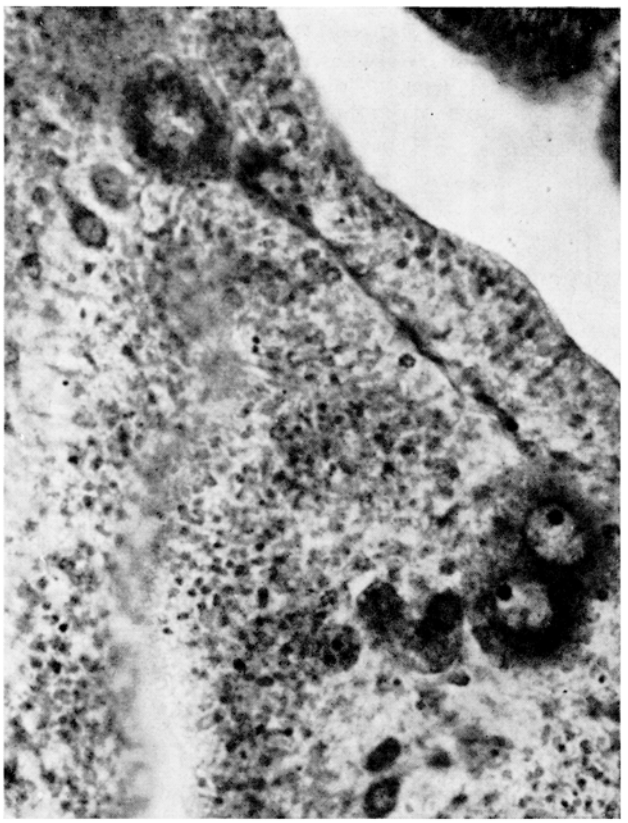

Fig. 1. Oogonia and small oocytes in a specimen at 14 months of age. × 700.

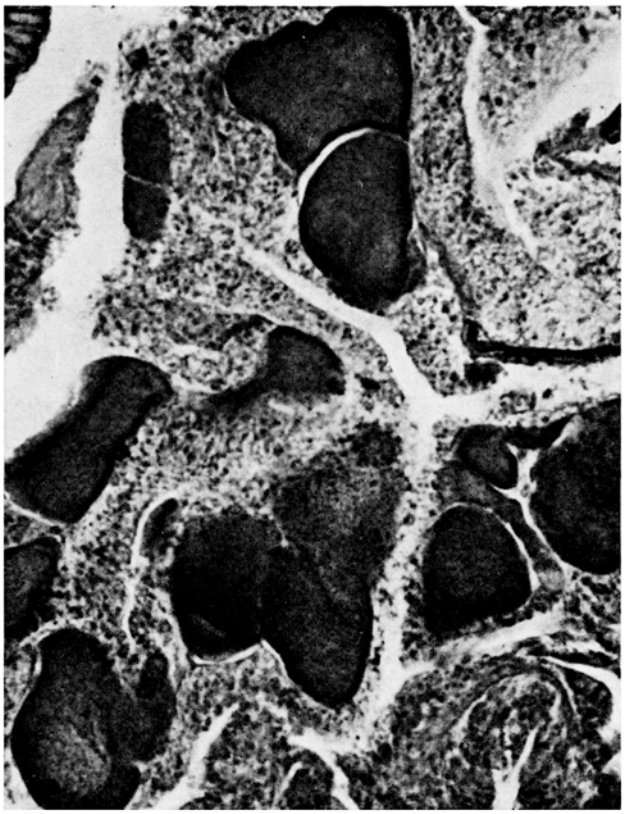

Fig. 2. Growing oocytes in adult specimen. × 700.

Fig. 3. Planules in mother's cavity.

In July 1968 10 specimens were isolated in different glass containers and within 13 months 370 young actiniae were obtained from them. The 10 specimens were subsequently fixed and sectioned and showed oocytes at different developmental stages along their septa and some free eggs, planulae and actinulae in their cavities (Figures 1–3). No traces of spermatogenesis were detected.

The young actinians which were obtained by such isolated specimens were also isolated and they represent the first generation. They developed very slowly and only a few of them, which were fixed at 14 months of age, showed a few small oocytes (Figure 1). The specimens which were kept alive began to produce actinulae at the age of 17–20 months.

Specimens of the second generation are now being cultured and the individuals of the first generation are still reproducing. It is thus demonstrated beyond any reasonable doubt that *C. pedunculatus* can reproduce parthenogenetically.

Difficulties inherent to cytological research on the actinians did not allow us so far to ascertain whether parthenogenesis is mictic or apomictic. A single instance of parthenogenetic reproduction has been described so far among Cnidaria. *Margelopsis haeckeli*, an Anthomedusa of the North Sea, appears in springtime and, according to WERNER[5], reproduces apomictically by thelytochous parthenogenesis and produces both subitaneous and resting eggs.

The reproductive conditions of the Leghorn's aquarium population of *C. pedunculatus* can be interpreted in two different ways. The peculiarities of the aquarium population may have been induced by purely phenotypic influences which may inhibit the development of male elements in an originally proterogynous species and induce the development of purely parthenogenetic eggs. On the other hand, the population from the Leghorn aquarium may be regarded as a distinct subspecies which is genotypically characterized both by the peculiar type of reproduction and by such characters as reduced size, lower medium number of tentacles etc.

Comparison with free living populations in the Leghorn coast, which are still being actively searched for, and the prosecution of cultures, will help to solve the problem.

*Résumé.* Des individus de *Cereus pedunculatus* se reproduisant dans l'aquarium de Livourne n'ont produit que des femelles, sans aucune trace de spermatogénèse. L'élevage d'exemplaires isolés a donné une première et une seconde génération toujours de femelles. C'est le second cas de parthénogénèse signalé jusqu'à présent chez les Cnidaires et le premier chez les Anthozoaires.

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## Ein neuer, bisher unbekannter Entwicklungsmodus bei einem Scyphopolypen

Der Lebenszyklus der Scyphozoa ist im typischen Fall durch die Metagenese gekennzeichnet, die Existenz der beiden Generationen des festsitzenden, sich ungeschlechtlich vermehrenden Polypen und der freischwimmenden Meduse, die sich geschlechtlich fortpflanzt. Die Medusenbildung erfolgt beim Scyphopolypen durch die Strobilation, die von oben nach unten fortschreitende Querteilung des Polypenkörpers. Bei diesem Vorgang entstehen die Ephyren, die Medusenlarven, die zunächst flach und scheibenförmig gebaut sind und anschliessend während ihres planktischen Daseins zu den geschlechtsreifen, oft hochdifferenzierten Medusen heranwachsen. Aus deren Sexualprodukten entstehen die Wimperlarven (Planulae), die sich nach einer kürzeren oder längeren planktischen Phase an einem festen Substrat anheften und zum Polypen umwandeln.

Dieser kurzskizzierte Lebenszyklus ist für den Scyphistoma, den Polypen der Ordnungen Semaeostomeae und Rhizostomeae, seit langem bekannt. Der Scyphistoma ist fast völlig nackt und besitzt nur ein rudimentäres, becherförmiges Peridermhäutchen an seiner Basis. Für den *Stephanoscyphus*, die Polypengeneration der Ordnung Coronatae, der sich durch eine feste, den Weichkörper vollständig umgebende Peridermröhre auszeichnet und sich durch dieses Merkmal unmittelbar an die Conulata, die fossilen Vorfahren der rezenten Scyphopolypen, anschliesst, sind die prinzipiell gleichartigen Vorgänge der Strobilation erst in neuerer und neuester Zeit genauer beobachtet und aufgeklärt worden[1,2].

Bei Untersuchungen über einen bisher unbekannten solitären Scyphopolypen aus submarinen Höhlen der Felsküste von Marseille, der durch den Besitz einer typischen Peridermröhre ebenfalls als zur Gattung *Stephanoscyphus* gehörig und somit als Coronaten-Polyp angesprochen werden musste, wurde kürzlich ein völlig neuer Entwicklungsmodus entdeckt, der in der Klasse Scyphozoa bisher keine Parallele hat und durch die Rückbildung der freien Medusengeneration charakterisiert ist. Dadurch, dass es gelang, den Polypen in Laboratoriumskultur zu nehmen und über den ganzen Lebenskreislauf zu züchten, war es möglich, den neuen Entwicklungsmodus in allen Einzelheiten aufzuklären.

Der Strobilationsvorgang als solcher folgt zunächst allgemein dem für Scyphozoen typischen Muster: der terminale Teil des Polypenkörpers teilt sich mehrfach quer. Dabei entstehen jedoch nicht die scheibenförmigen Ephyren, sondern relativ langgestreckte medusoide Gebilde, die eine deutliche Glockenform haben und Hydromedusen ähneln (Figur 1). Zu den morphologischen Unterschieden kommen in der weiteren Entwicklung andere ungewöhnliche Merkmale hinzu. Die in der Röhre des Polypen gebildete Kette von Medusenanlagen löst sich

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