on the hydrography, sediments, and the ecology of the Bay of Naples based both on foraminifers and ostracods.

During this study, it was realized that the nomenclature and taxonomy of ostracodes described by MÜLLER has undergone rigorous changes. Since the monograph contains valuable data on ecology which is scattered through this monumental work, this information is summarized in the accompanying Table. Changes in nomenclature and taxonomy appear in parenthesis after each species, which are listed in the same order as they appear in the monograph.

The following notes will clarify the taxonomic and nomenclatural changes made on the Table:

Aglaia rara MÜLLER[2] and *A. complanata* BRADY and ROBERTSON[2]. BRADY[4] described the genus *Aglaia* (type species *A. pulchella* BRADY). MÜLLER[2] doubtfully assigned both these species to *Aglaia*; he[5] later considered *Aglaia* to be a synonym of *Paracypris*, and transferred both these species to the latter genus. Since the name *Aglaia* BRADY was preoccupied by *Aglaia* RENIER[6] and *Aglaia* SWAINSON[7], SYLVESTER-BRADLEY[8] renamed it *Aglaiacypris*. SCHNEIDER[9] (in ABUSHIK et al. 1960) erected a subfamily Aglaiacyrinae based solely on this genus. Since BRADY gave only exterior views of the carapace of the type species, there was some doubt as to its hingement. However, characters of the carapace are sufficiently known to place this species questionably in the synonymy of *Cushmanidea*[10]. The type species of *Aglaia* and *Cushmanidea* BLAKE[11] are congeneric. Thus, *Aglaiacypris* is an objective synonym of *Cushmanidea* and the subfamily Aglaiacyrinae a junior synonym of Neocytherideidinae PURI[12].

Cytherura alata MÜLLER[2] is a homonym of *C. alata* LIENENKLAUS[13] which was published earlier than MÜLLER's monograph; a new name, *C. alifera* was therefore proposed by RUGGIERI[14] for MÜLLER's form.

Cytherura nigrescens MÜLLER[2] is preoccupied by *C. nigrescens* LIENENKLAUS[13]; a new name, *C. muelleri*, is here proposed for the Gulf of Naples species.

Cytherura neglecta MÜLLER[2] is a homonym of *Cytherina neglecta* REUSS[15] which was assigned to *Cytherura* by LIENENKLAUS[16]. *C. heinzei* PURI, a new name, is proposed for MÜLLER's form in honor of Mr. M. HEINZE, who prepared excellent illustrations that accompanied MÜLLER's monograph.

Loxoconcha levis MÜLLER[2] was renamed *L. turbida* by MÜLLER[5] because it was preoccupied by *L. levis* BRADY[17].

Loxoconcha mediterranea MÜLLER[2] is a homonym of *L. avellana mediterranea* SEGUENZA[18]. Therefore, *L. napoliana* PURI, a new name, is here proposed for the species erected by MÜLLER.

Since *Cythere elegans* MÜLLER[2] was preoccupied by *C. elegans* BOSQUET[19], MÜLLER[5] renamed it *C. lobiancoi*.

Cythere littoralis MÜLLER[2] was selected the type species of both *Callistocythere* RUGGIERI[20] and *Cryptocythere* MANDELSTAM[21]. *Callistocythere* obviously has priority and is the valid name.

Cythere fabaeformis MÜLLER[2] is preoccupied by *Cythere* (*Cytheridea*) *fabaeformis* SPEYER[22]. *Cythere muellerfabaeformis* PURI, new name, is proposed to replace MÜLLER's species.

Cythereis ornata MÜLLER[2] is a homonym of *Cypridina ornata* BOSQUET[23], which BOSQUET[24] considered to be *Cythereis*. A new name, *C. ascolii*, for Dr. P. ASCOLI, is here proposed for the Gulf of Naples form.

Cythereis lineata MÜLLER[2] is not *C. triplicata lineata* CHAPMAN and SHERBORN[25]. A new name, *C. dohrni*, is proposed for the Naples species in honor of Dr. P. DOHRN.

Riassunto. Discussione sulla nomenclatura e tassonomia correnti degli Ostracodi del golfo di Napoli e sul loro ambiente naturale. Si propongono 6 nuovi nomi.

H. S. PURI

Florida Geologica Survey, Tallahassee (Florida, U.S.A.), March 21, 1963.

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COGITATIONES

About Young's Modulus in Arterial Rheology

In view of the present increase in blood-vessel diseases, the study of the mechanical properties of arteries has gained renewed interest. On the other hand, the considerable development of rheology in the last few years has equipped the physiologist with a number of mathematical and physical tools which were not formerly available.

In Switzerland, a great many investigations in this field have been undertaken at the Physiological Institute of the University of Fribourg[1,2]. In 1959 MÜLLER[3] described a mechanical model of the aorta. Since this model, unfortunately, turned out to be useless, we were asked to search for another solution.

MÜLLER's model was not isomorphic because the structure did not fully satisfy the morphological data, and consequently the applied conception of the Young's Modulus was inadequate.

[1] V. HARDUNG, Helv. physiol. Acta *11*, 194 (1953).
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As REINER[4] says: 'The solution to this puzzle—viz. that simple normal stress does not correspond to simple normal deformation or strain (and *vice versa*)—is that 'simple' normal stress and deformation are not as simple as one may think'.

Let us first consider simple normal stress, for instance as produced by a simple pull upon a cylinder or prismatic steel bar in the so-called 'tensile test'. This is the predominant test for metals, but has also been in use for such materials as cement, pitch, bitumen, flour dough, etc. In this test a short bar, say of mild steel, of length l_0 is fixed between two pairs of jaws (or some similar device), one stationary and the other movable, and is elongated by a gradually increasing load P_n, where n indicates 'normal'. If A is the cross-sectional area of the bar, a traction is produced equal to

$$\varphi = P_n/A \tag{1}$$

acting in the longitudinal direction, or normal to the cross section, and which may be assumed as uniformly distributed over the cross section. The assumption is not correct near the ends, where the bar is fixed between the jaws, but it will be valid at some distance from the ends, especially if the bar is slender. Up to a certain point, the *elongation* Δl is proportional to the load and therefore follows Hooke's law. For this part we write by analogy

$$\Delta l/l_0 = (P_n/A)/E \tag{2}$$

where the coefficient E is called Young's Modulus.

The ratio $\Delta l/l_0$ is usually taken as the measure of the normal strain, here called Extension, positive or negative. For small elongations Δl there is no objection to this. For large elongations, however, this definition breaks down; firstly, for the same reason as advanced by many authors in respect of the volumetric strain; and, secondly, because there is no reason why $\Delta l/l_0$ should be a more correct measure than $\Delta l/l$, where $l = l_0 + \Delta l$. For $\Delta l = l_0$, the first gives a 100%, the second a 50% increase. A consistent definition would result from relating a differential of increase to the *instantaneous* length so that the element of strain is dl/l and the total longitudinal deformation, if large, is defined by

$$D_1 = \int_{l_0}^{l} dl/l = \ln(l/l_0) \tag{3}$$

in which formula both l and l_0 are of equal standing.

This logarithmic measure of extension was first introduced by Röntgen, of X-ray fame. It was first systematically employed by HENCKY[5]. We can develop the expression (3) as follows: (TRELOAR[6], GERMAIN[7])

$$D_1 = \ln(l/l_0) = \ln l_0 + \Delta l/l_0$$
$$= \ln(1 + \Delta l/l_0) = \Delta l/l_0 - 1/2(\Delta l/l_0)^2 + \dots \tag{4}$$

In fact, as EIRICH[8] says, the blood vessel can be assimilated to a *Bingham* body. Many experiments[9] demonstrate that there is no proportionality between a deforming force and intensity of deformation of blood vessels. Since Hooke's law requires such a proportionality, it cannot be applied to the rheology of blood vessels. FRANK[10] found for these tissues a new definition of elasticity modulus, where he replaces l_0 by l, the *effective* length:

$$E = l/m \tag{5}$$

where

$$m = \mathrm{d}(l - l_0)/\mathrm{d}\varphi = \mathrm{d}l/\mathrm{d}\varphi \tag{6}$$

The gradient m following the deformation curve is not constant, in contrast to the Hooke's elastic material. Therefore for blood-vessels:

$$\mathrm{E} = l \cdot \mathrm{d}\varphi/\mathrm{d}l \tag{7}$$

WAGNER[11] has utilized this relation for the construction of his continuous and indirect blood pressure measurement apparatus.

In conclusion, it is no use to construct further mechanical models such as those of FRANK and others, because their capacity of information is extremely limited, and today completely exploited.

Our opinion, after personal experience in this field, is that Bionics will provide the solution of the remaining problems in the near future. Some results have already been obtained in this way by RANKE[12] and more recently still by TAYLOR, who has not yet published his very interesting findings.

Zusammenfassung. Die klassische Auffassung des Youngschen Modulus kann nicht auf die Rheologie der Arterien angewendet werden. Der Autor diskutiert die notwendigen Korrekturen und weist auf die Grenze eines mechanischen Modells hin.

F. DITTRICH[13]

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Zum Wirkungsmechanismus des chemischen Strahlenschutzes

Vor einiger Zeit wurde über die strahlenschützende Wirkung von 1-Hydrazinophtalazin berichtet[1]. Wenngleich eine spezifische Verwendung der Verbindung als strahlenschützendes Pharmakon[2] kaum denkbar erscheint, so ist der experimentelle Befund doch insofern von besonderem Interesse, als es sich hier um einen völlig neuen Verbindungstyp handelt, der ebenso wie früher beschriebene Verbindungen, in erster Linie Thiole[3], die Eigenschaft aufweist, strahleninduzierte Schadenreaktionen in Organismen zu verhindern.

Eine generelle Theorie der Wirkung all dieser Verbindungen konnte bis heute nicht gefunden werden. Verschiedene mögliche Mechanismen der Schadenreaktion und der Schadenhemmung sind postuliert worden, die hier, kurz zusammengefasst, Erwähnung finden sollen.

Schadenreaktion:

(I) Harte Strahlung schädigt die Zelle durch direkte Trefferwirkung an einer für den Organismus wichtigen

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