the terms sulcus and sulculus for determining ventral or dorsal aspects is concerned the whole scheme is useless in so many cases that it fails of any importance. The terms are applicable only when these aspects, if they may be legitimately so called, are determined in some other way. Even though, as Haddon probably meant it should be used, the term *sulcus* be applied to that groove associated with the third pair of primary mesenteries, its use among fossil forms can hardly be said to be justified. Hence we may question the value of the term 'ventral stomodœal groove' in connection with the cardinal fossula. Indeed, we may go farther and question whether the Rugosa possessed gonidial grooves. If two grooves represented the primitive condition of the living Anthozoa we should find vestiges of a second in types with only one. The evidence, though negative, seems to point to a primitive Stomodæum without these grooves.

It is hard to see why the cardinal fossula necessitates the presence of a gonidial groove. It might have been due to the arrested development of the cardinal mesenteries (without that arrestation having been caused by a gonidial groove) combined with the other incompletely developed septa adjacent. Duerden admits, or rather independently asseverates, that such is the origin, but calls in the Siphonoglyphe to account for the small cardinal septum. What more likely than that the counter septum fossula is the result of arrested development of the corresponding mesenteries! On this wise all the fossulæ might be considered as old-age characters.

Before much can be asserted as to the order of development of the primary mesenteries in the Rugosa, specimens must be had which will indicate something about the sequence of the primary septa. It is not conclusive to reason from sections that do not inform us in this regard. In *Streptelasma profundum* the counter septum of the primary four seemed to reach farthest down into the calyx.

To summarize:

First, the argument from *L. proliferum* is not conclusive or final, since one can never be certain of having the lowest section. The statement can be extended to other forms studied by Duerden. Even *Streptelasma rectum* shows acceleration in the counter quadrants. In this form, a highly specialized type, the *tertiary* septa of the counter quadrants appear long before they do in the other quadrants, showing extreme acceleration in the counter quadrants. In an actual young specimen of *Streptelasma profundum,* in which the bottom of the corallum is shown, and the actual beginnings of the septa are visible, the four primary septa reach farther down than the secondary ones, and hence must be considered as having appeared before the secondary septa appeared. This shows the primary tetramerism of this type and is strong inferential evidence for all zaphrentoids.

Second, the inversion of figures counts for nothing. In referring to fossil forms of uncertain septal sequence and structural make-up the older terms are the more suitable.

Third, the hexameral arrangement of the septa in the Rugosa is not established, but rather is contradicted, by the evidence from the primitive members of the group. The primitive Rugosa appear to possess a pronounced quadripartite arrangement and a definite bilateral symmetry. Upon this symmetry and arrangement, by acceleration or otherwise, has been imposed a pseudohexameral arrangement, in instances, and a 'biradial symmetry.'

Fourth, this article really purposes to discuss the matter only and makes no pretense of ignoring other points of view, or of having settled the matter.

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UNIVERSITY REGISTRATION STATISTICS

TO THE EDITOR OF SCIENCE: As the figures of the University of Chicago were not received until the article on university registration statistics (SCIENCE, December 21, 1906) was in press, it was not possible to include an accompanying notice of changes in the fall registration. The facts of the case are these:

The enrollment figures of the university as of November 10 show a slight gain, from 2,130 to

2,179, in the fall courses within the quadrangles, and a considerable loss, from 562 to 247, in the courses outside the quadrangles. Owing to the increase in the summer session figures, however, there is a gain in the grand total. The change of courses given for teachers from the center of the city to the quadrangles, which took effect this fall, has lessened the number of students in such courses, but increased the efficiency of the work.

As for individual schools, there has been a gain in the academic department, especially in men, in law and in pedagogy, while there has been a slight loss in medicine, divinity and the graduate schools. As in the case of the University of Pennsylvania, a number of students enrolled in courses for teachers have been included in the Chicago figures who would be excluded in the Columbia or Harvard figures, but the time for making more definite inquiries was too short.

The following errors should also be noted: In the list of institutions mentioned on page 794, column two, line eleven, Stanford should be inserted between Kansas and Indiana; and in line fifteen Chicago should be omitted. On page 796, column one, line eighteen, Chicago should be inserted before Harvard. In the table, the number of men in the academic department of Princeton University should be 758, instead of 755. On page 794, column one, line twenty, insert, before Missouri, 'Syracuse (48.71%).' Rudolf Tombo, Jr.

ALCOHOL FROM CACTI

To the Editor of Science: In a letter entitled 'Alcohol from Cacti,' which appeared in the *Scientific American* for December 15, the author referring to the results obtained with this plant by a California chemist, states that "from five pounds of pulp he distilled, in a crude way, more than a gallon of alcohol, which was clear in color, and burned readily with a bright, warm glow."

At the time this article appeared we were hesitating about publishing the enclosed press bulletin for fear the theoretical estimates therein given would exceed the amount which it would be possible to obtain in practise.

Cactus will not average over 10 per cent. carbohydrates, and if, as is usually estimated, this yields one half its weight of 95 per cent. alcohol, it is not clear how it would be possible to obtain one gallon of alcohol from less than 140 pounds of this plant. If, however, the chemist referred to above can distil one gallon (seven pounds) from five pounds of cactus pulp, it would be interesting to know what the strength of his product is, and whether or not it was done with the assistance of a magician's wand.

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THE PARTHENOGENESIS OF ENCYRTUS

At the time that my recent note on 'Polyembryony and Sex-determination' was written I had not seen Silvestri's latest communication. In a brief, preliminary paper[1] he presents the results of his studies on the early stages of the development of *Encyrtus* and among other details notes the fact that, as in *Litomastix,* there is parthenogenetic development, unfertilized eggs always producing males, fertilized ones only females. The maturation and early segmentation stages studied are identical in the two types.

Wm. A. Riley

SPECIAL ARTICLES

POLARIZATION AND INTERFERENCE PHENOMENA WITH WHITE LIGHT

I have usually found great difficulty in endeavoring to explain the color phenomena obtained with white light in rotary polarization, in the behavior of thin plates with or without polarized light, and in interferences and diffractions generally, to an elementary class. The following diagram, therefore, which yields a large amount of information, may be of interest to the reader, although it contains nothing essentially novel. Note the occurrence of d/λ throughout.

Rotary Polarization.—If we write the rotation θ of the plane of polarization due to a thickness d of quartz cut perpendicularly to the axis,

$$\theta = \pi(1 - v'/v'') \cdot d/\lambda',$$

where v' and v'' are the velocities of right-handed and left-handed rays in the crystal

[1] Silvestri, F., 1906, 'Sviluppo dell *Ageniaspis* (*Encyrtus*) *fuscicollis* (Dalm.) Thoms.,' *Atti Acc. Lincei* (5), XV., pp. 650–658.