local sources or from equally good situations elsewhere.

Of course, the hypothetical case here given is typical only of men of small caliber who happen to occupy directors' chairs. Nevertheless, the proposed concerted action of executive officers to prevent competition in the securing of men for certain positions, by precluding the possibility of transfer, may in many cases work injustice to the men who are, in fact, responsible for the success of every station. By this combination, and the heading off of competition, salaries are held down to a disproportionately low figure, and the inspiration of possible advancement is withdrawn.

While the importance of retaining the services of valued members of a station staff is unquestioned, and while some means of ridding the service of undesirable workers is also essential, it is equally important for the success of the work that the individual have a sense of the security of his position and that he be not subject to the whims and moods of a 'boss' who does not recognize the difference between a body of educated gentlemen, who have quite as much at stake as he himself, and a force of clerks in a mercantile establishment or a factory.

On the other hand, and every well-balanced station worker recognizes the fact, the station must move forward as a unit, and there can be but one head. With a mutual understanding, and mutual confidence between the executive head and the heads of the scientific departments, the work will move forward without the necessity of 'combining' to hold down the workers, and with much saving of friction for all parties concerned. W.

THE PRIMARY SEPTA IN RUGOSE CORALS

IN SCIENCE for August 24, 1906, and in a more recent and longer paper[1] Dr. J. E. Duerden deals in a critical and analytical way with a paper read by me before the New York Academy of Sciences and published in full in the *American Journal of Science* for February, 1906. In that paper I offered another interpretation of certain figures which Duerden had drawn of sections made through *Lophophyllum proliferum*[2] and offered evidence for the support of my interpretation. Dr. Duerden's articles call for a reply. It is made in the same spirit in which the first paper was written.

It was, perhaps, to be expected that Duerden would not agree with my interpretation; but the excellent spirit of his article is commendable. I desire to discuss the matter in an equally fair manner, without any wish to belittle any work of investigation, to ignore a profound knowledge of the particular field of discussion, or to deny the possibility of other interpretations.

I still maintain the view that the resemblance to the Zoantheæ of certain rugose coral tips in dispute is not a structural resemblance, but an apparent likeness; that the important deductions about the origin of the cardinal fossula are largely based upon this supposed resemblance, and that the number of primary septa was four. If this appears to be obstinacy in the face of strong assertions to the contrary, I desire to submit the following argument.

I am not prepared to admit that the evidence afforded by the specimens of *Streptelasma profundum* examined by me is to be considered lightly. The forms examined were undoubtedly young specimens showing all the septa and having in the tip only four primary septa. In those specimens, which were much younger than the one figured by Duerden,[3] the cup was open to the bottom, thus allowing a complete view of the septa down to the tip —the septa not having reached the center in these specimens. If a section close to the tip of these specimens were made only four septa (protosepta) would be seen. Two specimens were examined by me, both of which showed unquestionably that only four protosepta were present in the youngest stage, and Professor Grabau assures me that several others of the same kind, though less perfect, are in the collection at Columbia University.

[1] *Annals and Magazine of Natural History*, Ser. 7, Vol. XVIII., September, 1906.

[2] See 'Johns Hopkins University Circular,' January, 1902.

[3] *Biol. Bull.*, June, 1905.

Unless Duerden can prove that all of these specimens are in some way defective and can show that the base of the third pair of 'so-called primary' septa (my first pair of secondary septa) were destroyed, so that in all cases they are shorter than the other (typical) primary septa (protosepta) he can not destroy the importance of this evidence. Those specimens begin as tetrameral corals, and continue so. Unless Duerden can satisfactorily show that this tetrameral character of the youngest stage is in these specimens a result of defective silicification his argument based on sections is incomplete. Duerden must show that it is possible for a hexameral coral tip to be changed by silicification, or otherwise, to a tetrameral one in more than one example.

I am not ready to concede that mere surface views are unreliable. I hold that the inside surface view of a young form is more reliable than sections made through the tips of adult individuals. In the absence of direct proof to the point and yet without intending to beg the question I would like to inquire how one can feel sure of one's section even in forms which are not accelerated? How much more uncertainty must the probability of acceleration add!

The fact that the so-called 'primary' septa (protosepta, Duerden) under dispute have positions both in locus and in sequence that coincide with those called for by Kunth's law, and that both of these facts point to their membership among the secondary septa (metasepta, Duerden), must again be urged, and the fact that the quadrant they occupy shows evidence of acceleration must be emphasized. This acceleration is shown in the case of *Streptelasma rectum* by the fact that these quadrants generally contain more secondary septa than the other two and by the further fact that tertiary septa (exosepta, Duerden) appear next to the counter septum before they appear in the other interspaces.

It must not be forgotten that *Streptelasma profundum* is an early form and devoid of specialized characters and that the forms studied were young ones; also that the forms studied by Duerden were not only specialized, but late in time (Devonic and Carbonic).

The reassertion that the order of development is that usually ascribed to zaphrentoid corals does not affect the explanation of the alar fossulæ as instances of retardation, nor does it affect the explanation of the cardinal fossula. The explanation of the cardinal fossula as caused by the siphonoglyphe (sulcar or sulcular) is certainly ingenious, but the assumption that the gonidial groove was present was made on the previous assumption that the Tetracoralla are related to the Zoantheæ, which in turn rests upon the doubtful ground of their primary hexamerism, which was assumed from a study of sections only.

What is to be offered as the explanation of the fossula of the counter septum region? And if it is to be that offered for the cardinal fossula—the presence of a gonidial groove—what is to be advanced in support of the zoanthidian relationship, since the chief structural peculiarity of the Zoantheæ is one gonidial groove?

When the correction of cardinal and counter septum is made the cardinal septum is seen to be the small one and this fact would apparently support Duerden's view that there was a gonidial groove in this region; but I have pointed out the necessity of finding another explanation for the fossula of the counter septum or else the alternative of acknowledging that both fossulæ are caused by siphonoglyphes, which would remove these forms yet further from their hypothetical zoanthidian relatives.

To my mind the inversion of the figures counts for very little. In Duerden's criticism at this point we find nothing that affects the argument—on either side, in fact. The dorse-ventral orientation is merely arbitrary.

Such unsatisfactory definitions for *ventral* are given for designating this aspect, that for determining which to call ventral and which dorsal we must decide whether, if there be two siphonoglyphes, one of these morphological structures is more pronounced than the other, or if there be only one, whether this, in colonial types, faces the proximal end of the colony.

It must be confessed that, so far as using

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.

C. E. GORDON
MASSACHUSETTS AGRICULTURAL COLLEGE,
AMHERST, MASS.

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