chordata' and included thereunder three divisions, (1) HEMICHORDA, or *Balanoglossids, Cephalodiscids* and *Rhabdopleurids;* (2) UROCHORDA, or *Ascidians*, and (3) CEPHALOCHORDA, or *Lancelets*. It is the present fashion to consider this affiliation as established, but it has not been proven beyond cavil. As a provisional hypothesis, however, it is the best of those that have been proposed, and there is no need to offer here any objections. Nevertheless, we should recall the fact that the lancelets and all other so-called 'Protochordata' must have very widely diverged from their common ancestors and that some of the characteristics of the first are probably the result of degeneration. When, for example, we find a specialized heart and auditory organs in Tunicates, as well as in many true invertebrates (even though they be not homologous), it is difficult to resist the inference that their absence in the lancelets is due to loss rather than to original failure of development. But now, with the necessary precautions and much hesitancy, we may assent to the possibility of the conclusions with which Mr. Willey closes his work.

"For the present we may conclude that the proximate ancestor of the Vertebrates was a free-swimming animal intermediate between the Ascidian tadpole and *Amphioxus*, possessing the dorsal mouth, hypophysis, and restricted notochord of the former; and the myotomes, cœlomic epithelium, and straight alimentary canal of the latter. The ultimate or primordial ancestor of the Vertebrates [or Chordates] would, on the contrary, be a worm-like animal whose organisation was approximately on a level with that of the bilateral ancestors of the Echinoderms."

The length to which this notice has already extended forbids attention to various other features of Mr. Willey's work. It must suffice to add that the fourth and fifth sections are devoted respectively to 'the Ascidians' (pp. 180–241) and 'the Protochordata in their relation to the problem of vertebrate descent' (pp. 242–293). For these we owe further thanks, and for all we feel assured future students of the groups in question will be grateful.

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CURRENT NOTES ON ANTHROPOLOGY (IX.).

THE RITUAL CALENDAR OF CENTRAL AMERICA.

IN the *Globus*, No. 18, 1895, Dr. E. Förstemann has one of his ingenious studies of the Central American Calendar, this time that portion of it called by the Nahuas the *Tonalamatl*, or Book of Days. This consisted of a period of 260 days, and strenuous efforts have been made by Mrs. Zelia Nuttall and other writers to treat it as a time-count, that is, as an aliquot part of the computation of astronomical years and cycles.

In this article Dr. Förstemann shows that this certainly does not hold good for the *Tonalamatl* as it constantly recurs in the Mayan manuscripts. In them it appears to be introduced for exclusively divinatory purposes, a basis for predicting events relating to persons or tribes, or else the weather, wars, disasters, etc. Not unfrequently a multiple of the period is embraced in the forecast, and very generally reference is made to the divinities assigned to the subdivisions of the *Tonalamatl*. Or, again, it is occasionally divided into its fourths, fifths or tenths; and what is noteworthy, the manuscripts present numerous similarities in these respects, proving that their writers were working on a like system of horoscopy.

I may add that the result of this investigation corroborates the position that I took in my 'Native Calendar of Central America and Mexico' (Phila. 1893), in which I maintained that the *Tonalamatl* was invented for and practically exclusively applied to divination, and not to the cyclical measure of astronomical time.

THE TREE AND THE CONE.

Every one who has given the least attention to works on ancient Assyria is familiar with the engraving which shows a winged deity, holding in one hand a small basket or bucket, and in the other something like a pine cone, which he is generally presenting toward a tree. This used to be construed as the 'cherub' offering the cone, a symbol of reproduction, etc., to the 'sacred tree' of Babylonian mythology.

A few years ago Dr. E. B. Tylor advanced the explanation that the true meaning is a representation of the fertilization of the female date palm, artificially, by the agriculturist impregnating its flowers with the inflorescence of the male tree. This was at once accepted by many writers, while others withheld their assent, asking why a winged cherub instead of a mortal should be depicted; and still further pointing out that this same ceremony is not rarely shown where there is no tree at all, but, say, the gate of a city, or some exalted personage, like a king.

These arguments have been repeated with emphasis by Dr. E. Bonavia in his recent work, 'The Flora of the Assyrian Monuments' (London 1894). He shows that the bucket or basket is certainly a *bucket*, intended for fluids, and inappropriate to carrying flowers. He offers the very plausible theory that it was designed to contain holy water, and the cone was an *aspergillum*, as it still is in the East. The winged cherub is the rain-bringer typified, etc.

This is far the most satisfactory interpretation which has yet been offered, and allies itself closely with numerous rites and myths of ancient Mesopotamia.

NATIONAL VERSUS INDIVIDUAL DEVELOPMENT.

The French have a knack of putting their conclusions in an aphoristic form, which, whether they are right or wrong, impresses the mind. An example is the following from a memoir by M. Dumont, published by the Paris Society of Anthropology last year:

"The increase of a nation in numbers is in inverse ratio to the efforts of its individual members toward personal development."

Now, if this is true, it means the discovery of a momentous law in sociology, which, among other consequences, will do away with all fears of over-population in free and enlightened states. Its corollaries would also dismiss both the dread of socialism and likewise of unscrupulous individualism, which two are the Scylla and Charybdis of modern political economists.

Of course, 'efforts toward personal development' must be construed as sensible and properly directed efforts towards a development which is really such, according to the highest criteria we now have. The reasons why such efforts would necessarily limit the numerical increase of a nation are evident enough. Whether these in the long run might not work as badly as the *laissez faire*, or 'go as you please' policy, is the question underlying this sociological puzzle.

THE SOURCES OF PERUVIAN CIVILIZATION.

In a paper in the Denison Quarterly, Vol. III., Dr. George A. Dorsey discusses 'The Character and Antiquity of Peruvian Civilization.'

He is inclined to assign it a greater age than has usually been allowed it. He would place its earlier periods contemporaneous with 'the golden age of Greece, or when the people of the Nile valley were in the zenith of their power.'

Generally, the historic or even the traditional cycles of the Quichuas are not supposed to carry us beyond about 1000 A. D. One historian, Montesinos, who names dynasties far more remote than this, has been

generally discredited, though he claimed native sources for them; and it is fair to add that we have no positive certainty how great the value of the mnemonic system of the Quichuas, their knotted and colored cords, the *quipus*, may have been. It has also been more than once argued that there must have occurred important modifications in climate since the great temples and cities on the cold plateaus were built, and harbored the large populations which must have dwelt in them. This would require a long period.

As Dr. Dorsey speaks from personal observations and extensive archæological explorations in Peru, his opinion, however at variance with that usually entertained, merits careful consideration.

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CURRENT NOTES ON PHYSIOGRAPHY (IX.)

THE GLACIAL ORIGIN OF LAKE BASINS.

AS LONG as lakes are regarded simply as locally deepened valleys, their explanation by glacial erosion may be fairly maintained; for when the problem is thus vaguely stated, the requirements to be met by the theory are so simple that the hypothesis of glacial erosion finds perhaps better reasons for acceptance than any other hypothesis. But as the facts to be explained are more carefully observed, they generally become more highly specialized and more peculiarly correlated; and their glacial origin may then be either confirmed or excluded. The peculiar association of features described by Lincoln (Amer. Jour. Sci., xliv., 1892, 290) and by Tarr (Bull. Geol. Soc. Amer., v., 1894, 339), regarding Cayuga Lake, seems on the one hand to demonstrate the glacial excavation of this basin; but, on the other hand, the extraordinary correlation of facts determined by various observers around Lake Zurich does not seem to be within reach of explanation by so simple a process as glacial erosion. In spite of so good a general argument for the competence of ice action as has been presented by Bohm (Verein zur Verbreit. Naturw. Kenntnisse in Wien, xxxi., 1891, 477), and in spite of the emphatic disapproval by J. Geikie of various other processes that have been suggested for the production of Alpine lakes (Great Ice Age, 3d ed., ch. xix.), the origin of Lake Zurich is certainly not to be accounted for by generalizations at a distance, but only by a special process that will fit all the facts found on the ground. Evidence tending to this end has gradually been accumulating for a number of years; but at an accelerated rate since Heim and Bodmer interpreted the meaning of the rock terraces on the valley sides, and since Penck, DuPasquier and others deciphered the records of the several glacial epochs on the north slope of the Alps.

THE ORIGIN OF LAKE ZURICH.

THE problem of Lake Zurich is presented in a masterful manner by Aeppli in the thirty-fourth number of the *Beiträge zur Geologischen Karte der Schweiz*, in brief as follows: The valley of the Limmat, in which the lake lies, was eroded in broad upland over which the *Deckenschotter* of the first glacial epoch had been previously spread. That the erosion of the valley was performed in the normal fashion by weather and water, and not by ice, is shown by the graded terraces or rock benches, traceable more or less continuously along its sides; these terraces being independent of rock structure, and associated with similar terraces in other valleys, all leading agreeably to the conclusion that after the first glacial epoch the region was generally elevated and the streams thereby given increased power of erosion. The *Deckenschotter*, where preserved on the ridges between the adjacent valleys, together with the terraces on the valley slopes, are bent backwards across a belt six