be determined; but I believe it may be safely assumed that the synchronism is defined within comparatively narrow limits; or, as previously expressed, "formations characterized by the same or very nearly related faunas in widely separated regions belong, in very moderate limits, to approximately the same actual age, and are to all intents and purposes synchronous or contemporaneous" (*Science*, No. 41). Professor Geikie, who is quoted by your correspondent as supporting the orthodox doctrine of homotaxis, or homotaxis in its broadest limits, judiciously refers to chronological divergences of only *thousands* of years, and *not* of *millions* ('Text-book of geology,' pp. 617-619). ANGELO HEILPRIN.

Academy of natural sciences, Philadelphia,
Jan. 12, 1884.

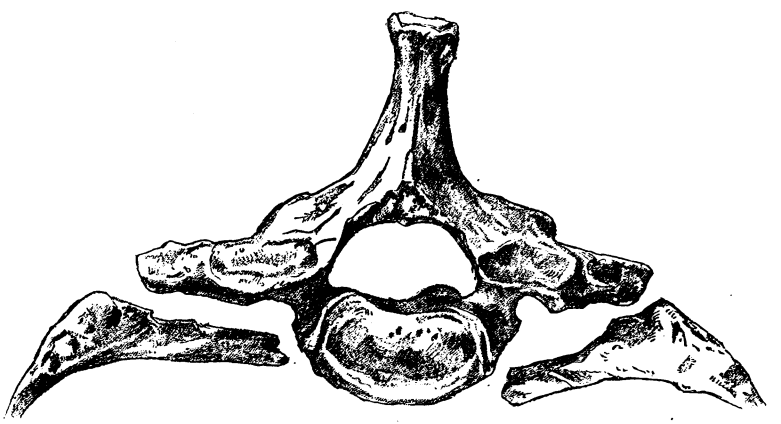
Free cervical ribs in the human subject.

I send you a photograph of a notable and very interesting anatomical preparation well worthy of being engraved and published in *Science*. It is the seventh cervical vertebra of the human subject, natural size, viewed from above, showing a pair of free cervical ribs. This demonstrates the fact that the so-called transverse process of a cervical vertebra consists of a diapophysis with a coalesced pleurapophysis, the vertebrarterial foramen so characteristic of cervical vertebrae being an opening between these two apophyses. The photograph shows the preparation so well that little description is required. The whole bone is seen to be a little distorted, and the two ribs are seen to be of different shape and size. The ribs are photographed a little apart from their respective articulations, otherwise *in situ*. Each freely articulates, as usual with ribs, by its head with the body, and by its shoulder with the diapophysis, of the vertebra. The base of each diapophysis presents anteriorly a nick (deeper and more regular on the left than on the right side) which is a part of the vertebrarterial foramen proper, the rest of which is circumscribed by the rib itself; the whole space between the vertebra and the neck of the rib being thus a large continuous opening of irregular contour.

The lower border of the body of this vertebra presents on each side a demifacet (not shown) for half of the head of the next (first dorsal) rib; so that the first dorsal vertebra must also have been anomalous in possessing two demifacets, instead of a full facet above and a demi-one below. The same subject was also badly put together in some other respects; e.g., one of the long thoracic ribs (I think the fifth) bifurcated at the sternal end. The specimens were handed to me by one of my pupils, Mr. Arthur J. Hall. The anomaly here figured, while not new, is so rare that I think I have seen but one illustration of it; namely, that given by Professor Owen in his 'Comparative anatomy and physiology of vertebrates.'

ELLIOTT COUES.

Smithsonian institution, Washington,
Jan. 4, 1884.



Seventh cervical vertebra of the human subject, life size, seen from above; showing well-developed and freely articulated pair of cervical ribs.

A possible solution of the standard time question.

Although the adoption of five standards of time for the movement of railroad-trains in the United States has simplified the time question for the travelling public, I believe it is a matter of deep regret, that, since a change has been made, that change could not have been to a single standard instead of five, and that Greenwich time, as Mr. Schott very significantly queries in *Science*, No. 38. This is the more to be regretted, since the railroad companies have found it impracticable to make the changes on the proposed meridians, and since, as Mr. Schott rightly apprehends, all ordinary business must always be conducted on local mean solar time.

It appears to me that this whole question could be very simply and forever settled by the adoption of Greenwich time for the movement of all public conveyances the world over, and the construction of time-pieces which would indicate at once both local mean solar time and Greenwich time. The only modification of the ordinary time-pieces needed, to enable them to indicate both times, is to provide them with two dials, one of which shall be movable about an axis, and capable of being set at any desired point. It is immaterial which dial is stationary: the same set of hands would sweep both dials, and indicate, of course, both times, at once. Thus provided, a person desiring to take the next train would be governed simply by the Greenwich dial. Furthermore, should his time-piece lose or gain, it would only be necessary to set it by either local mean solar time or by that of

any station, to have it right again both at home and with the world.

The adoption of such a standard would not necessitate the substitution of new time-pieces for those now in use, nor expensive alteration of them. A very simple, inexpensive way of adapting existing watches to the suggested change would be to etch the Greenwich dial upon the watch-crystal in a little smaller circle than that of the dial proper. The crystal could then be set to indicate the difference of time between the given place and Greenwich, and secured by a little white wax. Clocks could be similarly changed also.

If the hours are to be read from one to twenty-four, as seems desirable, and as some roads have already agreed to do, this will necessitate not only a change in the rate of motion of the hour-hand of time-pieces, but in the dial also. Now, since a change is to be made anyway, why not avoid twice changing by reconsidering at once the action already taken, and move immediately in the direction Mr. Schott has suggested. This would avoid the necessity of publishing in time-tables local times; while the traveller would have simply to consult his time-table, and refer to his Greenwich dial, to know at what moment to take a public conveyance, not only anywhere in the United States, but anywhere in the civilized world. Train-men and station-hands could experience no inconvenience in being guided by their Greenwich dial, it being necessary simply to make that dial the more conspicuous which is to be consulted oftenest.

F. H. KING.

River Falls, Wis.

THE DUTY ON IMPORTED SCIENTIFIC TEXT-BOOKS.

AT the last meeting of the American association for the advancement of science, there was some discussion of the effects of the existing tariff on foreign text-books on our school system. This is the first considerable effort to call the public attention to the results of our Chinese commercial policy upon the education of our youth. That system of policy is such a vast elaboration of rules, and the effects of its regulations are so hard to trace in the machinery of our society, that it has derived a strength and a safety from its very magnitude and its obscurity. The ordinary mind shrinks from the effort to trace the complication of its effects on great labor-employing industries like pig-iron manufacture. It requires the courage of a great soldier to give battle to the tariff on such fields; for, however convinced the free-trader may be of the right of his cause, he sees that his victory will mean destruction to many whom he cannot regard as foes. But here and there around the tariff jungle there are places that may be improved without danger of any serious consequences to great interests. Some years ago, in a lapse into discretion, if not into rationality, the tariff men took off the duty on quinine. A few score men had to seek other employment, probably to their serious but not permanent inconvenience, and that greatest of all helpers of the sick was free to go untaxed to its users.

As real though less sympathetic claim may be urged for the removal of the tax on educational materials and methods. Even in our money-earning state of society the amount that can be spared for the education of our children is so small that such money should be the last thing to receive the burden of taxation. What would have been thought, if in the fiercest struggle of the war, when we were taxing the physician's right to minister and the drug's power to heal, if some legislator had proposed to tax each college-student, say, three dollars a year, for the privilege of pursuing his education in the most effective manner? Taxes on this principle may be warranted in a besieged city; but even on our darkest day such a measure would have been laughed out of Congress, would have been denied even the rites of decent burial in a committee. Yet substantially this is what is practically done in this day of unparalleled prosperity, when, for the first time in all history, a government is sore burdened with its revenues. A commission of well-paid experts, charged to contrive some means to clear away this excess of income, retains this amazing tax after a year of pondering on the subject!

The singular character of the tax is evident enough in the most general statement of its nature, but close inquiry shows us that it becomes even less comprehensible the better we understand its details. The books excluded by the tax are not the spellers, readers, arithmetics, etc., that are made by the million. Against these, no foreign books would stand any chance whatever, unless they were introduced to the schools through the existing publication-houses. The books that are affected by the law are those that have at best a narrow sale. They are principally books in French, German, Latin, or Greek, used only in college classes for special purposes, which it would not pay any American publisher to reproduce. But let us suppose that the English, German, or other printers could furnish a set of school-books so decidedly better and cheaper than our own that our thrifty publishers should be driven from the field: will any reasonable man say that we should continue to maintain them by a head-money tax on the pupils of our schools?

There is no good reason to fear that our publishers would lose by a free trade in educational materials. If the change be made in such fashion that they may have as good a chance in foreign markets as foreigners should have in our own, we can trust the business