nal investigations. Even meteorologists outside the office, or employed by it as consulting specialists, may find it to their advantage to avail themselves of this opportunity for publication. Considering the great future evidently in store for meteorology, it is not surprising that Professor Abbe is, as we understand, diligently inquiring for those who are willing to come to his assistance in the effort to develop a systematic, deductive, and exact science of meteorology. We commend this subject to those whose studies have taken this direction. There are needed the investigator, the teacher, and the expert consulting-meteorologist, precisely as in other branches of science.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Chemical geology.

IT appears to me, that in his interesting communication in the number of *Science* for Dec. 28, Professor Winchell has fallen into an error, which, while diminishing by more than one-eighth his estimate of the secular increase of the earth's mass, is yet more serious from the stand-point of chemical geology. In determining the amount of carbon dioxide abstracted from the atmosphere and fixed in the earth's crust, he estimates, first, that represented by the carbonate rocks (limestone, dolomite, etc.), and, second, that required for the decomposition of an assumed thickness of decomposable silicate rocks; and both these amounts are included in his grand total. But this is certainly bad book-keeping, for a portion of the carbon dioxide is counted twice. The decay of the silicate rocks is a necessary antecedent of the formation of the carbonate rocks; and the carbon dioxide of the latter is precisely the same as that which has previously decomposed the former. In general terms, this grandest of all chemical processes proceeds as follows: the carbon dioxide of the atmosphere decomposes the felspars, hornblende, augite, micas, etc., of the silicate rocks, leaving the alumina and iron with the silica as a more or less ferruginous kaoline, and forming carbonates of the alkalies and alkaline earths, which are carried away in solution, and ultimately reach the sea, where the latter are deposited as limestone and dolomite, and the former react with the calcium and magnesium chlorides of the seawater, producing alkaline chlorides (chiefly common salt) and more limestone and dolomite. As Dr. Hunt has so clearly shown, the kaoline on the land, and salt in the sea, are merely incidental results of the fixation of the carbon dioxide of the atmosphere in the carbonate rocks. W. O. CROSBY.

Osteology of the cormorant.

Dr. Shufeldt's letter in *Science* (ii. 822) calls for a few remarks. In relation to his first statement, that 'the occipital style of the cormorant is not an ossification in the tendon of any muscle' of the neck, Selenka wrote as follows: "Eigenthümlich ist dem Carbo cormoranus und C. graculus, aber auch nur diesen beiden, ein an dem *occip. superius* durch bandmasse verbundener, dreieckig pyramidenförmiger, nach hinten gerichteter knochen, welcher die ansatzfläche der den kopf bewegenden muskeln soz. vergrössert; er ist ein sehnenknochen und gehört nicht zum schädel" (Thierreichs, 19). In view of such eminent authority, it would seem that something more than simple denial is required to upset a statement accepted by anatomists for many years. It is worthy of note that Dr. Shufeldt does not mention the nature of the bone in his article, and that, in ignoring the point to which I took exception, he virtually acknowledges his mistake. It is difficult to understand how one who does not know the position of a bone is qualified to expound its nature; and in all cases it is wise, if we would convince, to give reasons for dissent from authorities.

As to his second statement, that my ideas of the morphology of the rotular process are wrong, I would simply remark that the ideas referred to are not mine, but those of Nitzsch, of Meckel, of Tiedemann, of Owen, of Selenka, and of Mivart, and suggest that it would be appropriate to read such eminent authorities before disposing of them with an empirical denial. Dr. Shufeldt's paper clearly intimates that the rotular process of the divers is the homologue of the patella in other birds. The coexistence of the two disproves this by *reductio ad absurdum*. I would invite Dr. Shufeldt to quote the passage to which he refers when citing Owen as considering any process of the tibia as the analogue of the patella.

Lastly, Dr. Shufeldt states "that, furthermore, I find myself misquoted more than once." I would remind Dr. Shufeldt that I quoted him but once; and of the accuracy of this, any one may satisfy himself by referring to *Science*, ii. 642, 2d column, line 19.

J. AMORY JEFFRIES.

Electric time-signals.

Your correspondent who describes his method of making electrical signals in a recent number of *Science* (ii. 823) can greatly simplify and thereby improve his arrangement by inserting within the clock a couple of thin metallic springs with platinum contacts, the circuit being completed by the pressure of the hammer on the 'outward stroke.' The writer has had such an attachment to an ordinary 'programme clock' in constant use for about ten years, as is doubtless the case with many others who have had occasion to distribute time. The signals are transmitted to several buildings, in one of which an electric gong is struck, and in others a number of 'vibrating' bells are rung.

Mercury contacts are generally troublesome. The arrangement described seems unnecessarily complicated: besides, it is difficult to see the necessity for insulating the clock 'on a square of plate glass.'

M.

Columbus, O.

Capitalization of names of formations.

The use of capitals is a literary rather than a scientific matter; but geologists, nevertheless, suffer as a class from the existing confusion in regard to the names of formations.

Authors who are consistent with themselves in this matter fall into three classes. Those of the first class speak of the *P*otsdam, and of the *C*arboniferous, but of *p*otsdam strata and *c*arboniferous strata. In so doing they class the names of formations as proper nouns, but refuse to recognize proper adjectives. This practice employs a German idiom not otherwise countenanced in our language: we do not say *g*erman