that this presupposed descent from an ancestor common to these two groups in the Carnivora. He says that my statement "is evidently intended to give the impression that the 'gap' between them is not reduced as we trace them backward. That is very far from being correct." I never said or implied anything about the gap not being reduced; I said that it remains broad, and that "cats never became dogs nor dogs cats"—and they never did. This he admits.

He mentions my "new" theory of evolution with no explanation of the quotation marks. I never said it was new. What I said was that "It is rather a harmonizing of previous theories than a new idea; but parts of it [concerning the interrelationships of the phyla] are wholly new." This statement is absolutely correct. He adds that "the idea of separate origins of the major phyla of animal life [just what are major and minor phyla?] was a commonplace when I went to college in the late eighties, and still remains an open question, so far as I know." This gives a totally erroneous impression of my viewpoint. I traced all the phyla to a *common,* not to a *separate,* origin. Had he taken the trouble to read what I wrote in the paper to which I referred in a foot-note he would have discovered that I had offered a solution to the problem that so worried Professor Meckel in 1811 and interested him in the late eighties.

Lastly he says that my statements seem to him "gravely misleading as to the actual facts of phyletic evolution, although worded in so vague a way as usually to escape being absolute misstatements."

I would like to see Professor Matthew, or any one else, formulate general statements concerning phyletic evolution which will be equally applicable to crustaceans, insects, mollusks, vertebrates and other types of animal life and at the same time will not be "vague" when considered as a detailed exposition of the case in any single phylum or part of a phylum.

If Professor Matthew will point out a group of well-known creatures which demonstrate the principles of an evolutionary line or tree better than the horses, and another group of well-known animals that show systematic isolation better than the cats, we shall all be very grateful for the information. And if he will go further and arrange all the phyla in such a way as to combine a common origin and simultaneous development more logically than my scheme does he will have performed an outstanding service.

Until that time I can not see that he has any valid reason for dissenting from what I said regarding evolution.

AUSTIN H. CLARK

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ATMOSPHERIC ELECTRICITY

I WAS much interested in the account of the generation of static electricity in sand-storms, given by Mr. R. H. Canfield in SCIENCE for May 3, 1929.

On the night of April 30 I camped on the desert near Yuma, Arizona, with a companion; I slept on a cot while he occupied a mattress on the ground. During the night a sand-storm came up with a rather high wind. Being unable to keep control of the bedclothes on the cot, I moved into the car, which had an all-steel body, for the night.

Upon arising in the morning and touching the car, my companion received a rather painful spark from it, and this was repeated several times in the next few minutes. The storm meantime had blown out. There was no effect whatever so far as I was concerned.

A partial theory to account for this would be that the car body became charged with static of opposite sign to that of the ground; that my companion had a skin charge of the same sign as that of the earth and myself the same as of the car body, and that the potential naturally equalized when he touched the car. If this is true, however, I should have noted a spark between myself and the ground on getting out, but did not.

The unrest noted by Mr. Canfield is a very marked symptom in all the sand-storms I have experienced, and in some of them I have been inside sand-tight quarters and in a comfortable bed. On the other hand, I have slept in high winds unprotected, or in sandy blankets, without feeling particular discomfort —certainly not the same kind of discomfort.

This appears to be a subject which needs elucidation and experimentation, the results of which might be of more importance than may appear at first sight.

VICTOR A. ENDERSBY

R. H. CANFIELD'S article in the May 3 issue of SCIENCE on "Atmospheric Electricity During Sand Storms" brings to mind some accidental observations made by the writer in the late winter of 1919, which may be of some interest.

The writer was installing a wireless receiving set in his house in Boston, Massachusetts. Upon accidentally bringing the lead-in wire into close proximity with the ground connection, a strong spark was observed to jump between the two conductors. Two wires were arranged and varied until the maximum distance the spark would jump was found. This turned out to be about one centimeter. Thereafter sparks would jump at intervals of about two seconds with extreme regularity. The discharge began as a

slight hissing noise, gradually increasing in intensity and culminating with a sharp crack and a flash of blue light. The whole was strongly suggestive of the gradual charge and sudden discharge of a condenser. Observations were not made continuously, the writer being mainly interested in the installation of his radio, but five or six successive trials showed the phenomenon to last apparently continuously for a period of about four hours, from about four o'clock in the afternoon until about eight in the evening, well after nightfall.

The antenna was four-stranded, about one hundred feet long, of solid aluminum wire, and strung about ten feet above a thirty-foot house, the roof of which was of copper and grounded. The sky was overcast at the time; there was no wind and the atmosphere was heavily charged with moisture. The time of year was not one in which there are electrical disturbances in that locality, nor did any electrical storm precede or follow the observations for a period of many weeks.

The writer explained the phenomenon at the time as due to the gradual leakage of electricity from a highly charged layer through the moist air to the ground. The conducting antenna, being in an area of slightly higher potential, became gradually charged with respect to the ground. When this charge reached a sufficient magnitude, a brush discharge set in across the gap, increasing in intensity as the charge increased until it was able completely to overcome the resistance of the gap, when the whole escaped to the ground with the accompanying spark. The process was then repeated at a rate proportionate to the rate of leakage through the air.

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EDUCATIONAL SCIENCE!

DURING the last few days the freshmen in the college of arts and science at the University of Pennsylvania have been subjected to a series of achievement tests as part of the Pennsylvania state survey of relationship between secondary schools and colleges. This survey is in charge of the Carnegie Foundation for the Advancement of Teaching in cooperation with the College President's Association of Pennsylvania and the Pennsylvania State Department of Education. Similar tests were given to all freshmen in many other colleges and universities in the state.

Among the tests given was the Columbia Research Bureau Plane Geometry Test by Herbert E. Hawkes, Ph.D. (professor of mathematics and dean of Columbia College) and Ben D. Wood, Ph.D. (associate professor and director of Bureau of Collegiate Educational Research, Columbia College, Columbia University). Test Form B for High Schools and Colleges was employed in this examination. Part II is concerned with problems. A sample problem is worked out at the top of the page. This reads: "Sample. How many degrees are there in four right angles?—(180)." There is no chance of this being a printer's error inasmuch as "four" is printed out and the "180" is printed in script.

What I wish to raise is the question of marking the thirty-five problems involved in this part of the paper. The sponsors of this examination gave no instructions with regard to this error, hence we may suppose that it must be taken at its face value as a sample. This implies that all truly correct answers to the problems must be marked as incorrect! That is obvious. But what is to be scored as correct is not so apparent. Two possibilities present themselves: (1) All truly incorrect answers should be scored as correct; or (2) all correct answers must be divided by two in order to receive credit.

But seriously it seems inexcusable to me that such an error should not have been caught by either the authors or the publishers, especially when one considers that this alleged measuring instrument carries the copyright date of 1926. And the directions printed just above the sample question say in part: "This means that you must *check your arithmetical operations carefully* before putting down an answer." (Italics theirs!)

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SPECIAL CORRESPONDENCE

THE RECENT BONE-CAVERN FIND AT BISHOP'S CAP, NEW MEXICO

IT seems desirable at this time to make a brief preliminary announcement of what is believed to be an unusually significant bone-cavern find recently made in the lower slope of Bishop's Cap Peak in southwestern New Mexico by Mr. Roscoe P. Conkling, of El Paso, Texas.

Mr. Conkling, who for many years has been connected with the American Smelting and Refining Company, has had as a form of relaxation and recreation a very lively interest in the field study of archeology, coupled with a general interest in natural history, which in the course of his travels in connection with mining operations in remote fields has led him to examine and to study scores of burial