is scattered through many publications; my own contributions chiefly in the American Museum Bulletin. But in both groups, and especially in the Carnivora, a great part of the evidence has not yet got into print. I suggest that any one indisposed to accept these conclusions should examine the evidence, published and unpublished, on which they are based, with the object not of proving a theory but of discovering the truth. Some authors seem to believe that unpublished evidence has no right to be considered in a scientific discussion. This may be one of the rules of the game, if science is merely an academic exercise. But if our object is not to play a game but to get at the real truth as to the history of life, it is surely most foolish to disregard any evidence that may help us to a conclusion.

I leave to others the general criticism of Dr. Clark's "new" theory of evolution—merely remarking that the idea of separate origin of the major phyla of animal life was a commonplace of discussion when I went to college in the late eighties, and still remains an open question so far as I know. For the rest, his statements seem to me gravely misleading as to the actual facts of phyletic evolution, although worded in so vague a way as usually to escape being absolute misstatements.

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THE PRACTICAL SIGNIFICANCE OF INCREASING THE DAILY LIGHT PERIOD OF WINTER FOR STRAWBERRY BREEDING

A STUDY of the time of ripening of some of the standard strawberry varieties grown in the southeastern states from Maryland to Florida indicates that their relative earliness or lateness varies with the locality. In central Florida, fruit of the Missionary, the leading variety, begins to ripen in early winter and considerably earlier than Klondike. Farther north at Willard, N. C., the Missionary is no earlier than Klondike but nearly three weeks earlier than Howard 17. Still farther north at Glenn Dale, Md., the Missionary, Klondike and Howard 17 ripen at approximately the same time.

These results correspond to those reported by Bradford[1] for the peach and apple. He noted that differences in the flowering period in peach varieties might be masked at Columbia, Mo., while farther south the same varieties showed striking differences. He correlated this behavior with a rest period. The Missionary and Klondike strawberries, however, have no definite rest period and plants of these sorts set in the fall in Florida grow vigorously throughout the winter. Moreover, when taken into the greenhouse at Washington in the fall they continue growth throughout the winter. Other differences also showed up in the warm greenhouse. Both varieties blossomed but the Klondike made the stronger leaf growth. From this it would appear that Klondike is better adapted to the very short days of midwinter in the reduced light intensities of the greenhouse. Both sorts responded far more to the increase in temperature than did most northern sorts. In fact, when taken into the greenhouse in October the Howard 17 made practically no growth whatsoever.

A study of the behavior of these varieties in the greenhouse during the short days of the winter in response to increased daily light exposures obtained by supplementing the normal illumination period from sunset to 10 P. M. has shown still other differences. Two-hundred and one-hundred-watt lights with reflector shades were placed approximately sixteen inches above the ground surface so that the area lighted by each was seven square feet. The plants were given the supplemental light from October 20 to January 19. Growth was not as vigorous under the 100-watt lights as under the 200-watt lights, but the different varieties responded for this three-month period in the same way under the 100 as under the 200-watt lights.

When the daily light period in the greenhouse was increased by the use of the electric lights the Missionary variety responded more quickly than the Klondike, while the Howard 17 still made almost no response. Other northern sorts made varying responses to this increased daily illumination, some making almost no growth, others a growth almost as vigorous as the Missionary even though making almost no growth under the normal winter day. The tests, so far, indicate that in contrast to peaches and apples, some varieties represented by the Missionary and Klondike seem to have no rest period; other varieties apparently "rest" in the greenhouse under the normal short days of low light intensity but grow vigorously when given an increased daily light period; while still others which made very little growth when brought into the greenhouse on October 20 or December 10, started to grow vigorously when brought in February 1, and may, perhaps, have a rest period of the type of the peach and apple. Greater intensity, different quality or longer duration of artificial light than were used might, of course, have broken the rest period of this last group. English varieties, represented by the John Ruskin and Jucunda, and an Alaskan variety were among the least responsive to increased daily light periods even when brought into the greenhouse as late as February 1. This behavior

[1] F. C. Bradford, "The Relation of Temperature to Blossoming in the Apple and the Peach." Mo. Agr. Exp. Sta. Research Bul. 53: 1–51. 1922.

suggests their need of a very long daily light period as occurs in England and Alaska during the growing season.

Among the new varieties originated by the U. S. Department of Agriculture, U.S.D.A. No. 659 has been found especially well adapted to North Carolina where it is as early as Missionary, one of the leading commercial varieties of that state. When grown in the greenhouse in midwinter, with the daily light period increased by electric lights it responds even more quickly than Missionary. This suggests a better adaptation than Missionary to southern conditions where the spring growth occurs under short days. Other selections resulting from breeding work tested under increased daily illumination in midwinter have shown widely different responses, some corresponding to that of Missionary and others to that of such varieties as Howard 17.

Because the daily light period and the amount of light received in a day varies so widely for the different parts of the winter and because strawberry varieties respond so characteristically to additional light, results obtained at different times during the winter may be quite different, yet afford valuable data in helping to understand the normal varietal behavior in the field where most successfully grown. The response of about 140 sorts suggests the possibility of a classification of new originations and introductions on the basis of their rest periods, their response to temperature and to additional light as a first step in determining their regional adaptation.

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THE PRECISE EXPRESSION OF "DRYNESS"

IN referring to the viability of algal resting cells over long periods under comparatively dry conditions, Otis[1] has given an example of the need, in a great variety of comparative studies, of an exact method of expressing moisture conditions or degrees of dryness so that different observations may be correlated. Otis mentions a reported case of algae living for seventy years in stored soils containing from 3 to 10 per cent. of moisture. These quantities mean nothing without a knowledge of the type of soil involved, but probably imply enough "free" water in the soils so that the resistance to drying of the algal cells was not taxed in the slightest; in fact it is conceivable that the cytoplasm might never have been strictly dormant during all this period as conditioned by dryness. On the other hand the same author refers to a medium of small twigs, needles and rock fragments, on which algae are at present being stored, which is "very dry." It undoubtedly makes a good deal of difference to these algae whether the medium was "dried," and is now being held, in an atmosphere of 30 per cent. or one of 90 per cent. relative humidity. It is an accepted principle that the algae, the rough material, and the atmosphere of the storage jar must be, after a short time, in vapor-pressure equilibrium; it is, therefore, a perfectly simple matter to express the moisture condition of the entire system, in such a case, in concrete terms, of which the relative humidity at any moderate temperature is the simplest. It is also a simple matter to measure the state of the system for such an expression by placing weighed samples of the material in desiccators whose relative humidities have been predetermined by placing in their lower chambers various mixtures of water and sulphuric acid, or other chemicals. The gain or loss of weight by the sample indicates its position in the scale with all the precision necessary, provided the different desiccators vary in their humidities by steps of not more than 10 per cent. The method gives a reference point for moisture conditions on a great variety of materials whose physical properties vary so widely that direct comparisons of "moisture contents" are meaningless or impossible. It is, of course, not directly useful for materials whose moisture condition is above the lower limit of "free" water, for example, wood above the fiber-sat. point, or soils above the "wilting coefficient."

The writer has found in studying the viability of coniferous tree seeds that "air-dry" is entirely too indefinite an expression for indicating the status of seeds placed in storage. Depending upon the weather conditions, the presence of artificial heat indoors, etc., this term might mean drying to equilibrium with atmospheres of 60 per cent. or of 20 per cent. relative humidity, which in turn might mean the difference between 5 per cent. and 3 per cent. moisture content of the seed itself. With at least one species, a critical condition of dryness, affecting viability within a short time, appears to be reached at equilibrium with about 25 per cent. relative humidity. At least, small differences in this region may be of considerable importance. Hence the need for a precise method both of controlling and of expressing the condition in living materials.

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THE STONING OF A MINOR PROPHET

THE intuition of poet or artist has on occasion been responsible for significant predictions in the

[1] Chas. H. Otis, "The Viability of Algae," SCIENCE, N. S., 68: 1754, August 10, 1928.