Comments and Communications

Chemical Research in Israel

PROFESSOR LEOPOLD RUZICKA (*Science,* **112,** 126 [1950]) has based the evaluation of the organic chemical research carried out in a given country, not on the total number of publications per annum in the field of organic chemistry (Boig. *Science,* **110,** 107 [1949]), but on the ratio number of inhabitants: number of organic chemical papers published. I would like to be permitted to add to the interesting data so obtained the figures related to Israel, taking into account, of course, the great variation in the number of the Israeli population. The pertinent figures are:

For 1937: 36,000 (av. for the years 1935–39: 23,000)
For 1947: 33,000 (" " " " 1947–49: 37,000)

inhabitants for each organic-chemical publication.

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The Bible and the Earth's Shape

IN THE September 8, 1950, issue of SCIENCE W. A. Rockie tells of a "strong religious leader" who believes the world is flat. He didn't state the nature of this man's religion. As a fundamentalist Presbyterian and also as a member of the American Chemical Society's Committee on Scientific Aids for Literature Searching, I am much interested in locating early statements of scientific fact and seeing that the original source receives the proper credit.

The Bible itself nowhere states that the earth is flat. It does, however, have a number of passages concerning the shapes and conditions of the world, past, present, and future. I shall name but a few, giving scriptural texts:

1. At one time in its early history, the earth had no definite shape at all, either flat or round (Gen. 1: 2—"And the earth was without form, and void . . .").

2. The earth is suspended in an ethereal vacuum and is part of a universe of immeasurable size. Furthermore, any attempt to detect the presence of a supporting medium, such as the Michelson-Morley ether-drift experiment, will give a null answer (Job 26: 7—"He stretcheth out the north over the empty place, and hangeth the earth upon nothing"; Jer. 31: 37—"Thus saith the Lord; if heaven above can be measured, and the foundations of the earth searched out beneath, I will cast off all the seed of Israel for all they have done, saith the Lord").

3. A particularly striking picture is given by Job concerning the rotation of the earth. To understand it, one must be aware of the type of seals used by ancient peoples such as the Babylonians, Phoenicians, etc. These seals, perforated longitudinally and rotating upon a tiny axle of some hard material, were pressed against the face of the damp clay and rotated. As the seal was turned in the clay, it left its inscription. In like manner our earth is journeying on her annual orbital revolution. At the same time the planet is spinning on its axis, turning in the face of the sun like the seal in the face of the clay (Job 38: 14—"It is turned as clay to the seal; . . .").

4. The earth is round, not flat (Isaiah 40: 22—"It is he that sitteth upon the circle of the earth, . . ." Note: The word "circle" is a translation of a Hebrew word that literally means "roundness." The modern Swedish version uses the word *rund* which is a literal rendition of the idea of Isaiah).

5. The earth will be destroyed, but some of the inhabitants will be saved (Matt. 24: 35—"Heaven and earth shall pass away, but my words shall not pass away"; John 3: 16—"For God so loved the world, that he gave his only begotten Son, that whosoever believeth in him should not perish, but have everlasting life").

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Fern Prothallia under Cultivation for Twelve Years

THERE is considerable evidence that fern prothallia are like many other plants in that they will extend their life span if kept from reproducing. In 1927, Mottier reported that he had been able to keep prothallia alive for 4 years (*1*). In 1946 the author reported the continuous growing of adventitious prothallia at Marietta College for 7½ years (*2*). A few of these same prothallia were still alive in September 1950, 12 years after the spores were first sown in the flowerpot.

Because of competition of blue-green algae growing in the pot and lack of care during the author's absence, the surviving prothallia died sometime during October 1950. The dead tissue of the remaining prothallia was examined for reproductive organs, since these were reported in the older tissues in 1946 (*2*). Only occasional sporophytes developed after the first year after the spores were sown, and none appeared during the past 5 years. The prothallia maintained themselves by producing lateral proliferations. It is not the purpose of this paper to account for the lack of sporophyte production when reproductive organs were present, but the author believes it is largely due to the fact that there was never enough water around the prothallia for fertilization to take place. The pot was watered by subirrigation; thus, the culture received its water by capillarity from below. Very seldom was there enough moisture for

condensation to be observed on the glass bell-jar.

As Mottier (*1*) suggested, fern gametophytes will probably grow indefinitely if no sporophytes develop. The Marietta plants grew approximately 12 years with very little attention other than watering. This, to the author's knowledge, constitutes a record.

References

1 MOTTIER, D. M. *Botan. Gaz.*, **83**, 244 (1927).
2. WALP, R. L., and PROCTOR, G. R. *Am. Fern J.*, **36**, (4), (1946).

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Individualistic or Statistical Approach?

IN THE past several months there have appeared in the pages of this journal several brief discussions, discussions that have a far more deep-lying significance than might appear on the surface. Even with due consideration of the risks involved in getting into someone else's argument, I believe that the following lines will clarify the most important point of the controversy (Huntsman, **110**, 566 [1949]; Goulden, **112**, 233 [1950]).

The central point of the argument is the determination of whether an investigation of a physical event carried out by the methods of statistical approach, and dealing with an aggregate of a large number of units, is of more fundamental nature than the investigation based on observation of the more intimate features of the individual units comprising the aggregate.

The logical answer is not a single entity. Thus, the use of statistical methods, per se, has given us many of the commonly known "general" laws used in most branches of physical sciences. No one can argue against the certain degree of utility of such generalizations in our study of the universe. The same universe, however, contains a great many examples that clearly show the inadequacy of the statistical view in applications to *all* problems (as is seemingly desired by one of the parties in the argument). The statistical approach fails utterly to supply us with the basic, fundamental reasons for the events that do take place. To illustrate, a decay curve of a radioactive element is the result of a statistical examination and, as such, may be used to estimate with considerable precision the relative decrease of population of a species. It fails utterly, however, when we try to see the reason why a particular atom, or a number of atoms, suffer degradation whereas their neighbors are unaffected. It seems obvious that some manifestation of incipient event must take place before the atomic catastrophe, unless cause and effect are to be completely discarded. Equally obvious may be the observation that knowledge of the phenomena that precede the event in the individual atom would be of much more fundamental nature than the observations of what happens after the event takes place, especially when only the gross manifestation of a "mob" is observed. To come down to the everyday level, consider the case mentioned by Huntsman, in which a successful insurance applicant passed on to an undoubtedly better world immediately upon receiving his policy. It is a custom of the insurance companies to examine their potential customers with some care, especially when a large sum is involved. Obviously, the man in question must have had some signs of impending doom in his system, yet apparently medical science had no way of detecting or estimating them. Does the fact that the statistical tables indicated a period of X years of life ahead of this man alleviate in any way the impact of the individual's death on his immediate family (or the checkbook of the insurance company)? Obviously, it does not. In addition, the statistical approach tends to close the door upon closer, more intimate, and more individualistic approach to the basic understanding of the reasons for the collective behavior of a mass of units.

If we are to take the reason for the existence of physical science to be our curiosity about the world around us, and if we pose to ourselves the questions "how" and "why," rather than "what," it would appear that the individualistic approach is the more fundamental one. Unfortunately, at this time we are just beginning to tackle the study of the individual material units, and our instruments and devices are too crude. May we hope that the future will see a justification of this view, or else each of us will become the ith component of a statistical mob.

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Errata

WE HAVE been informed by the author (Kipnis, F. *Science*, **113**, 40 [1951] that in his Formula XVII, page 42, he omitted – OH at position 5. In the same article, column 1, page 42, the paragraph which begins, "The pseudosapogenins, dihydrosapogenins, etc.," became pied after leaving our hands. This should read: "The pseudosapogenins, dihydrosapogenins and dihydropseudosapogenins, assuming that all have similar ring structures, are named as pseudosapogenans."—Editors.