duce something that pays. In this lop-sided scientific development there is a heavy spiritual and intellectual loss.

It is true, as Mr. Hoover says, that there is also a practical loss. The pure science of to-day is changed into the practical science of to-morrow. The discovery of the Hertzian rays was pure science, but it gave us Marconi's wireless. Becquerel's discovery of radioactivity was pure science, but to-day every large hospital has its radium tubes. Present-day studies in photosynthesis are academic, yet if we ever manufacture carbohydrates synthetically it will be upon the basis of such studies. The great principles of pure science, like Mendel's laws and Dalton's atomic theory, have been keys to unlock whole treasure-houses of practical advantages. As yet the United States has produced few men eminent in this field. Of nearly fifty Nobel prize winners in chemistry and physics but two have been Americans.

The best argument for pure science, however, takes little account of its value in dollars. A nation that pours out billions on movies, chewing-gum, radios and automobiles can afford to endow the search after truth for truth's sake more generously. We should feel a sufficient interest in the widening of the bounds of the human mind to give such a search both more applause and more support. Pure science insists upon the pursuit of wholly disinterested objects; upon sincere and fearless work; upon only one standard—the highest standard. These are aims which America emphasizes all too little for its moral and intellectual good.—*The World,* New York.

SCIENTIFIC BOOKS

Traité de Géographie Physique. Tome Premier, Notions Générales—Climat—Hydrographie. Quatrième édition. pp. xii, 496. EMMANUEL DE MARTONNE. Librairie Armand Colin, Paris. 1925.

ABOUT sixteen years ago Emmanuel de Martonne, professor of geography at the Sorbonne, published the first edition of his well-known treatise on physical geography, a single volume of 910 pages. To-day the fourth edition of this work is appearing in three volumes, largely rewritten and greatly increased in size, in response to the insistent demand that more and more knowledge be covered by that pancosmic subject.

The book begins with the pertinent question: What is geography? The reply, covering twenty-five pages, with twenty-eight references to eminent authorities, discusses the growth of that knowledge called geographical, and the evolution of its treatment from the days of Homer, stage by stage, to the very present.

For a long while, a time that some of us still remember, geography was the naming of capitals and the bounding of countries, but to-day it is, at least, the distribution over the face of the earth of all phenomena, physical and biological; how they got where they are, and their relations to each other. Clearly, therefore, a real up-to-date geographer must be master of many subjects and Jack of all the rest. I once remarked to an eminent professor of this science that according to this modern concept one might teach even theology as a branch of geography, and his instant reply was: "I do, I do. Religion affects human distribution, and religion involves theology, which therefore I must teach."

The next seventy-five pages are given in approximately equal parts to astronomy, map projections and geophysics. This is followed by an account, covering 225 pages, of the climates of all parts of the earth. The rest of this first volume discusses oceans, lakes and rivers, and the phenomena connected with them.

Every page is clearly written and interesting, but, however urgent the need, there is no trace of mathemathics anywhere, save one very short equation, on page 160, in which the symbol signifying the angular speed of terrestrial rotation, by some curious slip, is called gravity acceleration. This absence of all mathematics is, perhaps, necessary for the average student of geography, but if so, more is the pity, for in many places the subject is such that it can not be understood without resort to this powerful aid to clear thinking.

Professor Martonne's treatise has the exceptional merit of being so excellent as to deserve perpetuation and improvement. With this object in view, I shall, therefore, call attention to a few minor points that deserve, perhaps, a little further consideration:

On page 77, it is stated that a decrease of the carbon dioxide in the atmosphere by 55 to 67 per cent. would cause a lowering of the temperature of the air by 4° C. to 5° C., and a doubling of the carbon dioxide an increase of temperature by 7° C. to 8° C. Perhaps so, if carbon dioxide were the only absorbing element surrounding the earth, but with water vapor always present, and much more effective, the changes in temperature thus produced certainly would be far less. Water vapor leaves but little radiation for the carbon dioxide to absorb.

The explanation of the diurnal variations of pressure, as given on pages 172–173, is entirely inadequate. It also contains two slight errors in detail. The observations referred to were not by sounding balloons, as stated, but by kites; and the temperature wave was not over the sun, but at the surface of the earth.

On page 179 relative humidity is defined as the

extent to which the air can still take up water vapor. This, of course, is not relative humidity, but saturation deficit.

We are told on page 182 that the sudden conversion of cloud to rain may be caused by an electric discharge, and that this occurs in the thunderstorm. This idea, if ever seriously entertained, certainly has long been abandoned.

The worst slip in the book occurs on page 309, where it is stated that temperature decreases with altitude, because of the rarefaction of the air, whose heat capacity decreases with density. This is one of several entirely erroneous explanations various people have given of this well-known phenomenon. Perhaps it might be in place to add also that its correct explanation—the assignment of the causes (convection, expansion, radiation and absorption) that are both necessary and sufficient—seldom is found in any book or paper.

The drainage wind down valleys is erroneously explained on page 324 as being caused in substantially the same way as the land breeze, instead of by surface cooling.

It is stated on pages 393–394 that the temperature of the deeper portions of a near-inland sea is that of the bottom of the strait connecting it with the ocean. This, however, is not always true; it is not true, for instance, of the Red Sea. In fact the temperature of the abysmal waters is substantially that of the densest portion of the sea in the course of the year, as determined by salinity and temperature jointly.

An amusing error occurs on page 443, where it is stated that on the Dead Sea, density 1.166, an egg floats two thirds above the water. Perhaps some eggs do, but all such should be handled with the greatest care.

As implied above, these are only trifling slips in a work of great excellence. Some of us, accustomed to deductive reasoning, would enjoy a larger number of postulates and generalizations than occur in this work. They would shorten the reading and materially aid the memory. However, it is not plausible deductions, but established facts that Professor Martonne has given, and given exceedingly well.

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SPECIAL ARTICLES

AN APPARENT CASE OF MONOCENTRIC MITOSIS IN SCIARA (DIPTERA)

MONOCENTRIC mitosis has long been known in the case of artificially treated eggs (sea urchins, etc.), where it frequently results from mechanical injury or exposure to chemicals.[1] The evidence from such sources indicates, as noted by Wilson (*l.c.*, p. 169) that the process is a pathological one. The only other record known to the writer, of anything approaching a monocentric mitosis is that of the peculiar mitotic figure found in the abortive first spermatocyte division of the hornet (*Vespa crabro*) as described by Meves and Duesberg.[2]

In the latter case, as in the former, the process differs essentially from typical mitosis in that no nuclear division and no distribution of chromosomes takes place.

While studying chromosome behavior in flies of the genus *Sciara* the writer has observed what appears to be a process of monocentric mitosis occurring as a normal and regular event at the primary spermatocyte division. This case, unlike those cited above, involves a division of both nucleus and cell and a definite and regular distribution of chromosomes to the daughter nuclei. The chromosomes do not divide at this division, and the cell divides unequally; but both of these features are found in other organisms where the spindle is bipolar, and neither is to be regarded as indicative of an abnormal or a pathological condition. Likewise, since this is the reduction division, lack of chromosome division does not involve later complications.

When this peculiar mitosis was first observed it was viewed as an abnormality, but a careful study has convinced the writer that it is a normal and constant mode of division of the primary spermatocytes in two and probably in many or all species of this genus. The two species studied most extensively thus far are *Sciara coprophila* Lint., and *S. similans* Joh.

The main characteristics of this division, of which a full account will appear later, are as follows:

(1) The chromosomes are univalent and diploid in number (a condition due, apparently, to the absence of synapsis).

(2) No aster or centrosome is visible, but spindle fibers are evident and all extend to one pole.

(3) All the chromosomes appear to be attached by spindle fibers to this pole.

[1] Boveri, Hertwig, etc. For general account see Wilson, E. B., "The Cell," Macmillan, New York, 1925, pp. 168–192.

[2] 1908. "Die Spermatocytenteilungen bei der Hornisse." Arch. f. Mik. Anat. 71: 571–587. It should be noted that in the related species, *Vespa maculata*, Mark and Copeland (1907. Proc. Amer. Ac. Arts Sci. 43: 71–74) describe a bipolar spindle at this division, which suggests that the observations of Meves and Duesberg should be verified.