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.

W. J. HUMPHREYS

U. S. WEATHER BUREAU

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.

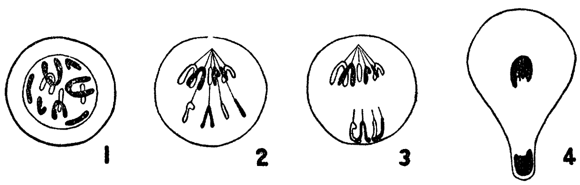
(3) All the chromosomes appear to be attached by spindle fibers to this pole.

[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.

(4) No equatorial plate is formed, the chromosomes passing from their prophase positions directly on their anaphase course.

(5) The chromosomes do not divide, but are segregated bodily into two groups.



Figs. 1–4. Diagrams representing, respectively, the prophase, early and late anaphase and telophase of the primary spermatocyte division in *Sciara coprophila*. In another species, *Sciara similans*, the two hook- or J-shaped chromosomes are replaced by V's. Actually, of course, the chromosomes lie at different levels in the cell. This is indicated very imperfectly in the figures by drawing those at a low level in outline and the others in solid black. It will be noticed that each of the four chromosomes going away from the visible pole has a counterpart or "mate" going toward the pole. The remaining two chromosomes (at the left in figures 2 and 3) are larger than any of the others, and both go regularly to the visible pole.

(6) An unequal distribution is effected, six chromosomes passing to the visible pole[3] and four going in the opposite direction. This segregation is a selective, accurate and regular process.

(7) Those going to the pole follow a convergent path and show the characteristics typical of anaphase chromosomes.

(8) The four going away from this pole are more elongate and are characteristically different in appearance from the others.

(9) They are irregularly placed in the cell and follow divergent instead of convergent paths. Like the other chromosomes they move along radii from the visible pole, but instead of approaching the pole they pass directly away from it (Figs. 2 and 3).

(10) The point of spindle fiber attachment of these four chromosomes appears to be normal—certainly it is in the case of the V-shaped ones, which are attached at the apex. But this point is posterior instead of anterior, and the chromosomes (at least the V-shaped ones) move backwards.

(11) The anterior ends of these chromosomes appear to lie free and show no indication of traction, while the posterior ends, to which the spindle fibers are attached, are usually taut and slender as if under tension.

(12) These four chromosomes continue to follow divergent paths until they approach the periphery of the cell, where their course is deflected and becomes convergent, ultimately bringing them together at a point opposite the visible pole.

[3] For an account of spermatogenesis in these flies see Metz, 1925, Science 61: 212, and papers in press.

(13) Subsequently an evagination occurs at this point and a very unequal cell division occurs, resembling the polar body formation of an egg (Fig. 4).

It will be noticed from this summary that asters and centrosomes are not visible in these cells, and hence that the mitotic figure is not known to be strictly of the monaster type. It is possible—although the evidence is all against the view—that an inconspicuous aster is present on the side opposite the visible pole. If so, the movement of the chromosomes seems to be independent of it. The feature of primary interest is that the spindle is clearly unipolar and all the chromosomes are "attached" by spindle fibers to this pole, even though some of them move away from it instead of toward it.

Those which move toward it exhibit the ordinary characteristics of behavior, while those which move away from it are reversed and otherwise give clear indications of being subject to a pulling or retarding force acting in the direction of the pole.

Without attempting a detailed discussion of the mechanics of this division it may be noted that to the writer the figures give convincing evidence of the presence of two forces acting in opposite directions, the one, represented by the spindle fibers, "pulling" toward the pole as just mentioned, the other, indicated by the movement of the four chromosomes, acting in the opposite direction and carrying these particular chromosomes bodily away from this pole. These chromosomes look as if they were anchored by flexible fibers to the pole and yet were being carried away from it by a radiating current. This is, of course, a purely descriptive statement, and not intended to suggest that such a current is actually present. The behavior of the chromosomes makes it more probable that the spindle fibers represent currents (as appears to be generally true of the astral rays, from the work of numerous observers) while the opposing force is of a different nature, possibly electrical (R. S. Lillie, and others). On the latter view the six chromosomes going to the visible pole would have the opposite electrical charge from the others, so that on them the action of the two forces would be coincident instead of antagonistic.

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SOCIETIES AND ACADEMIES

THE AMERICAN PHYSIOLOGICAL SOCIETY

The thirty-eighth annual meeting of the American Physiological Society was held on December 28, 29 and 30 at the Western Reserve University School of Medicine, Cleveland, Ohio. The attendance was