solution is obviously, as Needham now admits, not to be found in any such device as numbering species. The use of quadrinomials I also object to; it is confined to few authors and to few groups of animals, and is not recognized by the International Rules, to which Needham makes too little reference. The use of trinomials to designate incompletely differentiated forms most systematists believe to be sound and unavoidable, and when logically applied leaves the binomial specific name available for the use of those who do not need or those who do not care or those who are unable to split the subspecies of the species in question.

Thus the evil, or virtue, of subspecies "splitting" need not worry those who long for a simple nomenclature (even if the simplicity be artificial). The splitting of species, when sound, unavoidably alters the scientific name and can be ignored only through ignorance or arrogance. The splitting of genera into subgenera need not worry the worshipers of brevity, for there is no need for quoting the subgenus in the scientific name. But the splitting of genera into smaller genera does alter the name. So does the transfer of species from one genus to another. The Rules of Nomenclature have no primary application to such taxonomic changes. These changes are at the base of an ever-increasing proportion of the unfortunate shifting of names. Fewer and fewer alterations are due to the uncovering of overlooked available names or to alteration of the species interpretations.

It is becoming increasingly clear that these name changes, due to genus splitting or shifting, are the chief concern of those who long for a stable nomenclature. It is unfortunate that the changes in genus concept should alter the scientific name of an animal. The fault lies in the binomial system of nomenclature. This system confounds classification, which ought to be flexible, with nomenclature which should be fixed. A uninomial system of animal names would divorce classification from nomenclature and would presumably emphasize the fact that the species is the most natural and objective of all systematic groups. It would certainly shorten animal names. The uninomial system has been found workable in mineralogy, chemistry and astronomy, and would have many advantages in zoology.

I do not propose the present adoption of any uninomial system of zoological nomenclature. I do emphasize, however, the facts that the tendency to split has continued, despite occasional set-backs by lumpers, from the time of Linnaeus until the present; that in some groups the splitting of genera has gone so far as to produce a high percentage of monotypic genera; that for such groups there is a tendency, in conversation or in general works or in the frequent repetition of the name in technical papers, to allow the generic name to stand for the whole scientific name. We are to this degree now heading toward a uninomial nomenclature of animals. That this system will be gradually and eventually adopted I venture to predict. If the uninomial system is not accepted, or until it is, I see no hope for ever arriving at a really stable nomenclature. In the meantime we can devise ways of surviving without this stability.

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SEA-LEVEL CHANGE NEAR NEW YORK

IN *Bulletin* of the National Research Council, Number 70, just issued, there is an erroneous statement. On page 35, paragraph D, it is stated that "Tidal observations at Fort Hamilton extending over a period of 35 years indicate no appreciable change in sea-level at that point during the period of observations."

As a matter of fact, the probable change in sea-level at Fort Hamilton between 1893 and 1927 is at the average rate of a rise of one foot in 214 years (by the least square method 0.0047 feet a year $\pm$ 0.06). Though the probable error of this result is great, it is more likely to be at the rate of 0.6 feet per century (.006 feet per year) as suggested by J. R. Freeman than to be with "no appreciable change."

Curiously, taking the last twenty-five years, from 1903 to 1927 inclusive, the rate would be .0055 feet a year.

The whole question deserves further consideration which we hope it will receive. For instance, M. R. Campbell's suggestion that meanders in streams flowing essentially at and below tide level are indicative of drowning, Bull. G. S. A. (1927) pp. 537–555, has a bearing.

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WILLIAM FITCH CHENEY, JR.

ASTRONOMY IN SOUTH AFRICA

THE paragraph quoted from *Science Service* in the issue of December 20, 1929, headed "Astronomy in South Africa," contains several inaccurate statements.

The large refractor of the Radcliffe Observatory has an aperture of twenty-four inches, not eighteen inches. The University of South Africa does not possess an observatory, and there is no observatory in Cape Town other than the Royal Observatory. The twenty-four-inch photographic refractor of this observatory has an eighteen-inch visual refractor on the same mounting.

Neither the University of Michigan nor the Yale University has branches in the grounds of the Union

Observatory, Johannesburg. The University of Michigan southern station is on Naval Hill, Bloemfontein; the Yale University southern station is in the grounds of the University of the Witwatersrand, Johannesburg.

The southern branch of the Harvard Observatory is at Mazelspoort, about fourteen miles outside Bloemfontein.

H. SPENCER JONES
H. M. Astronomer

SCIENTIFIC APPARATUS AND LABORATORY METHODS

SHAKING MACHINE FOR ANALYTICAL WORK

THE world's industrial progress has been measured by a number of different inventions, especially applied mechanical devices. When time became very precious, as it is in our days, human ingenuity had to stretch its limits seeking some machinery to save labor and energy.

A chemist in his laboratory, for example, knows how to appreciate all his apparatus which make him able to carry on his research or routine work quite conveniently. The shaking process, which is sometimes an important factor in analyses, is a very tedious and time-consuming operation. Yet, using a properly constructed shaking machine, the process becomes easy and simple. The shaking machine will do good and rapid work in many instances.

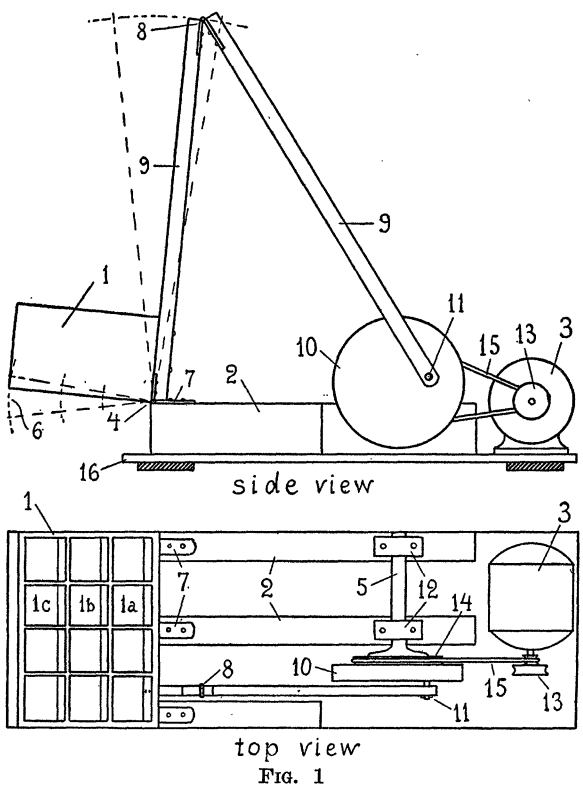

FIG. 1

The accompanying diagram represents one of the many useful shaking machines which have been designed and used in my laboratory of experimental embryology. This machine consists of a box with compartments (1) hinged to a base (2) and brought into a swinging motion by an electric motor (3) through a mechanical "system of four-links chain," where (4) and (5) are the axes of oscillation and rotation, and (6) is the maximum amplitude of swinging. Other parts of the machine are indicated: the hinges (7) and (8), shear legs (9), fly wheel (10) with crank and pin (11), bearings (12), motor pulley (13), driving pulley (14), belt (15) and base plate (16).

The shaking can be done in the box (1) with several samples under various amplitudes of swinging. The first row of compartments (1a) provides mild, the second (1b) moderate and the third (1c) intense shaking. If it is necessary, the amplitude of swinging in the machine can be easily adjusted by displacing the crank pin (11); and the speed of rotation can be regulated by the speed of the motor (3), using either a rheostat or several sizes of driven motor pulleys (13).

The machine described above, owing to its double action, or "swinging motion," might be particularly desirable in a thorough but gentle shaking or in any other special type of analytical work.

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AN APPLICATION OF STREAK AND HARDNESS USED IN CLAY GRADING

THE streak of a mineral is commonly used by mineralogists and geologists in its determination when the hardness of the mineral is less than that of the streak plate, but it is seldom that the mineral specimen itself serves as the streak plate for another substance and is thereby identified. This latter method, however, is used by workmen mining diaspore clay in Missouri to estimate the quality of the diaspore in the clay pits.

They have observed that when a lump of diaspore clay is broken by either a pick or "gad" (a steel wedge) a dark mark, the streak of the abraded steel tool, is left upon first-grade clay, whereas the inferior clay is only crushed or compressed where it is tooled. The workmen speak of the clay as "blacking" or "marking" well when the streak left upon the clay boulder by the iron tool is distinct.