by the camphor specialist. The treatment of the subject is purely theoretical, and in that respect differs from the valuable paper "On the Constitution of Camphor" read at the British Association in 1900 by Dr. Lapworth.

A short introduction is followed by a chapter giving a *résumé* of the various camphor formulæ arranged in historical order, starting from that proposed by Victor Meyer in 1870 and coming down to that of Schryver in 1898. This history of camphor formulæ is an interesting example of evolution. The formula proposed by Bredt in 1893, and now generally accepted, seems best to explain the constitution of camphor and its numerous derivatives, and is the one adopted by the author.

In the third chapter the practical data on which the constitution of camphor rests are recorded under twelve heads, such as "camphor is a ketone," it "contains the group $.CH_2.CO$," "camphor and camphoric acid are saturated compounds," &c., all of which conditions are fulfilled by the Bredt formula. In this connection, to the researches of Brühl on the refractive index might have been added those of Perkin on the magnetic rotation, as confirming the bridged ring structure of camphor. The inconsistencies of other formulæ with the above-mentioned facts are briefly pointed out in the fourth chapter. The degradation products are next treated, and the monograph finishes with a discussion of the constitution of camphene and bornylene.

The clear manner in which Prof. Aschan indicates how some of the many seemingly inexplicable reactions probably take place is worthy of comment. The difficulty of excluding unimportant details and including all that is important in such a monograph as the one under notice has been overcome by the author with great success. J. E. M.

*Theorie der Bewegungsübertragung.* By Richard Manno. Pp. iv + 102. (Leipzig: Engelmann, 1903.)

In laying down the fundamental notions of mechanics there has been divergence of opinion concerning the definition of force. There is the distinction between cause and effect, between statics and dynamics. The older school has regarded force as the cause of motion, modern theorists prefer to define and measure force by the effect only. Herr Manno attempts to construct a system of mechanics by regarding force as neither cause nor effect, but as the phenomenon of motion itself, and further, in order to get rid of the notion of action at a distance, every instance of force is supposed to be due to impact, so that motion is transferred from body to body by a succession of intervening impacts. Accordingly the attempt is made to develop the theory of impulsive forces from the simple cases of direct and oblique impact. Naturally, in this view, some divergence is found from the ordinarily accepted theory. The proportionality of cause and effect as implied in the "second law of motion" obviously fails when the momentum of a striking body is regarded as producing the momentum of a struck body.

It must be confessed that the author's theory, when its meaning is disentangled from the mass of verbiage with which it is swathed, does not seem to smooth the way towards a clear apprehension of the principles of mechanics. His leading idea seems to be that purely theoretical conceptions, such as action at a distance, must be discarded, and that all the terms used must represent observable phenomena. The author probably has in his mind the subject of a discussion recently appearing in NATURE, as is evidenced by sundry physiological allusions, and his objection to the technical meaning of "work" when applied to living organisms R. W. H. T. H.

## LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

### On a Map that will Solve Problems in the Use of the Globes.

In mapping an extensive region of the earth in separate sheets, there are great advantages in dividing the region into belts by parallels of latitude, and modifying the law of representation in passing from each belt to the next. This plan is illustrated by the accompanying sketch, which represents a region extending from the equator to the North Pole, and covering 80° of longitude.

The map consists of nine sheets, each covering 10° from north to south, and 80° from east to west. The meridians are indicated at every tenth degree, and are straight lines, all of the same length, at right angles to the parallels of latitude, which are arcs of circles. The two parallels which bound each sheet are on the same scale as the meridians, so

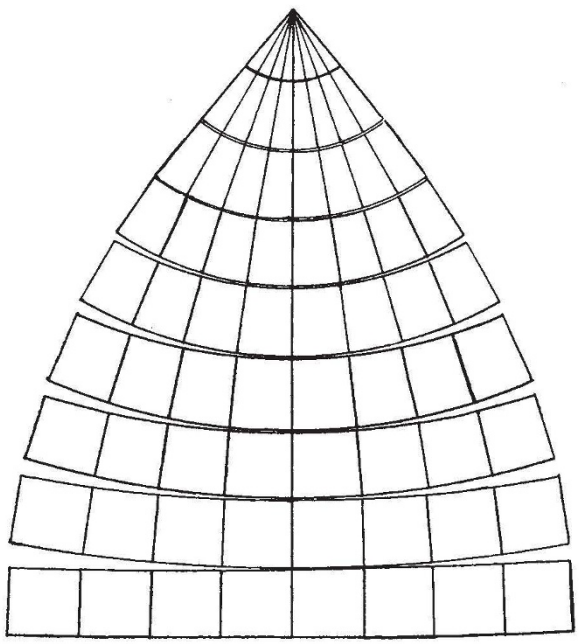

FIG. 1.

that the four sides of each of the seventy-two compartments of the map are precisely equal to the lengths which they represent on a spherical globe; and no difference is made between extreme and central meridians, all longitudes being treated alike. The intermediate meridians and parallels will be at right angles, as well as those shown, and the meridians will be of correct length. The intermediate parallels will be a trifle too short, the defect amounting, in the case of the middle parallel of each sheet, to rather less than 1 part in 250, a difference too small to be detected by the eye.

In examining on the map the borderland of two sheets, the two sheets are to be placed in contact at any point on the parallel common to both, and then, on rolling the edge of one sheet against that of the other, the whole border region from end to end will pass in review. All the successive meridians, when they are brought in turn to the point of contact, will be seen as straight lines crossing the point of contact, and the same will be true for the two portions of any oblique line which crosses the boundary.

If we want to trace a great-circle route from one place to another, we have merely to roll the sheets into such positions that the points of contact lie in a straight line