because of the large amount of jarring. Frequently the neck will be flexed forward to an extreme position if the head is supported firmly behind.

### Limitations of the Impact Decelerator

One serious objection to this apparatus is that the seat belt does not strike the individual in exactly the same area as it may in an aircraft accident. A set of side-arm rollers which are attached to the seat allows the seat belt to simulate more closely its position in the aircraft (Fig. 1). However, in this type of seat the rollers and side arms absorb 60–70 per cent of the applied force, so that the weights which are dropped on the individual must be increased accordingly to obtain the same impact force as is delivered with the original type of seat.

Another objection is that the vascular system of an individual in position in this apparatus may behave quite differently on impact than if he were sitting upright. This influences responses such as blood pressure and pulse rate immediately following impact. The horizontal position also displaces the viscera posteriorly and superiorly. Visceral movement is more restricted during impacts in this device than it would be in an actual aircraft crash. It must be stressed that the straps, and not the individual, are accelerated. This simplifies observations by electronic and photographic devices during the impact.

The trained subject soon learns to brace himself for impact loads and develops his own technic for taking the simulated crashes. Some individuals tense all muscle groups for the impact, while others relax. It is undoubtedly true that some of the force of the impact is absorbed during an actual crash by the legs and thighs extended against the rudder pedals. Such an opportunity is not present in this apparatus.

*Addendum.* Since the submission of this paper for publication, studies of controlled aircraft crashes have shown the duration of deceleration of dummies restrained with the regulation restraining harness to vary from 55 to 90 milliseconds. This enhances the usefulness of the impact decelerator for continued investigations in aviation safety.

# *Letters to the Editor*

### Suggestions Regarding Principles Acting in the Use of the Bantu Divining Basket

Throughout the Bantu tribes in Africa the divining basket plays an important part in the life of the people. In times of concern and anxiety over illness, the absence of relatives, or adverse agricultural and economic conditions, the services of the diviner are sought. He is an important figure in the community and has learned his art while a young man from an older diviner. The divining basket is a woven basket containing 40–80 articles and covered by a lid. The articles can be described as fetishes, images, and objects having symbolic representation, such as a wounded man, a pregnant woman, etc. For example, the basket usually contains: a duiker horn, the wide open end at the base signifying 'mouth' ("a scolding mouth," "one who talks too much," etc.); a piece of organic tissue representing the placenta; white chalk, meaning innocence; a turtle bone, signifying a patriarch of the family; a piece of stone worn smooth by running water, which means that the patient is being worn down by one pain or trial after another. The diviner shakes the basket in such a way as to manipulate any article to the top of the pile. He then prophesies from the basis of the article at the top of the basket. On many occasions the diviner makes a prophecy which is fulfilled.

It is suggested that two factors are important in the success of the diviner. One is that he is conversant with the situation from local gossip and his position in the village. This is recognized by his clientele, who frequently seek the services of a diviner from another village, fearing that their local diviner may manipulate the fetishes so as to render a course of action favorable to his personal interests or the interests of his vested group.

The second suggestion is that the diviner uses the objects in the basket as a projection test, comparable to Rorschach's Psychodiagnostic Plates. Although he does not insist that his client discuss each object brought to the top of the basket, he has been observed to watch his subject closely, apparently for any responses, verbal and nonverbal. It has been noticed that in the absence of a response to a certain object the diviner will shake the basket again, bringing a different article to the surface. It seems reasonable to presume that over years of experience, working in a specific society, the diviner has learned empirically the characteristics of responses which are related to different types of individuals under various stresses. By observing facial responses, bodily gestures, any exclamations or remarks, and reaction times, he could appraise the individual from these projections, and with a knowledge of local situations he could render a decision which would be more likely to be adequate than if chance alone were the only factor operating.

This hypothesis has been advanced to attempt to relate an important phase of Bantu life, which on first atten-

tion might seem to have supernatural connotations, to psychological tests in the field of perception and apperception, such as the Rorschach Technique and the Harvard Thematic Apperception Test.

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### Meteor Trails on the Moon

In *Science* (1946, **104**, 448) there is a letter from James Bartlett, Jr., explaining his concept of what N. J. Giddings, of Riverside, California, saw and described as "flashes streaking across the moon." I should like to discuss briefly Mr. Bartlett's explanation and show not only that it is contradictory to simple facts that can be secured by careful observation of the new moon at twilight, but that his statement that the meteorite trails would be visible only with the dark surface of the moon as a background is quite in error.

First, the new moon, if observed carefully, will be found to show, up to the fifth or sixth day, the usual "earth shine" phenomenon; the side that is not directly illuminated by the sun is not entirely dark, but reflects secondarily light that has first been reflected from the earth. Thus, the "dark" portion of the moon is actually lighter than the surrounding sky, and if meteor trails were visible against the "earth shine" illuminated disc, they certainly could be seen against the surrounding darker sky.

Accordingly, Mr. Bartlett's statement that the meteor trails "would be visible for *just that portion of their path* which had the dark side as its background" is thought to be quite in error, as the "dark side" of the moon is at least no darker than any other nearby part of the sky and is usually somewhat lighter due to "earth shine." Thus, a meteor would, in theory at least, be no more visible over the moon's darkened disc than elsewhere in the sky and would possibly be less so, if of a very faint magnitude.

Whatever might be the true explanation of Giddings' observation, I feel Mr. Bartlett's theory, although ingenious, is fundamentally unsound.

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The communication from James C. Bartlett, Jr., concerning the projection of meteor trails on the moon (*Science*, 1946, **104**, 448) reopens the fascinating possibility originally observed and reported by N. J. Giddings (*Science*, 1946, **104**, 146).

However fascinating the original observation was, the reasoning followed by Bartlett is even more amazing. He says, in substance, that meteors entering the earth's atmosphere would not have been seen against the bright sky but, crossing the *dark* surface of the moon, would be visible.

How is this dark surface of the moon to shine darkly through the scattered atmospheric light which comprises the sky? Is this some new and visible manifestation of the "black light" we so often see headlined in the popular press? Bringing the dark portion of the crescent moon to this side of the sky so that it can be darker than the sky reminds one of the pictures of the horned moon with star embraced therein.

Records of previous observations of lunar flashes would be timely, as well as a written, brief, and "courteous discounting" by the authority first consulted by Giddings.

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### On the Concepts of Mitosis

A lag exists between our concepts of mitosis as taught at the elementary and graduate levels and the picture as it has emerged in the last decade. The average biologist thinks of nucleolus and chromosomes as lying free and unoriented in the karyolymph and of the metaphase plate as the product of forces of attraction and repulsion between chromosomes and central bodies operating in a more or less uniform field.

For 10 years I have been analyzing the movements of nuclear chromatin in relation to the topography and movements of the cytoplasmic elements in the grasshopper follicle and onion-root tip meristem. Several important features have come to light:

(1) The centromere, and often the telomere regions, maintain association with the nuclear membrane throughout the interphase or "resting" condition.

(2) The nuclear membrane plays a role in the formation of the metaphase plate, which becomes a rough projection in one plane of the relative positions occupied by chromosomes at prometaphase.

(3) Heterochromatic regions are for the most part those associated with the nuclear and nucleolar membranes. Chromatin in the condensed state tends to be associated with these membranes. In fact, chromatin at all its levels of integration seems to be associated with the surfaces of structures of which it forms a part.

We may now superimpose upon the above the following established facts and current assumptions:

(4) The chromosomes in the interphase of rapidly dividing cells maintain their telophase polarity. Even in longer interphases, where the chromosomes shift positions considerably, this polarity is never wholly lost.

(5) The nucleolus is typically borne on definite loci of definite chromosomes.

(6) The centromere, telomere, and nucleolus-organizing regions are usually heterochromatic. Conversely, the bulk of heterochromatin is located in these regions. Centromere and telomere concentrations are known as chromocenters.

(7) Centromeres and telomeres have many properties in common.

(8) These regions are sensitive to external conditions.

(9) They are frequently associated with concentrations of cytoplasmic bodies.

(10) In many plant cells (e.g. *Allium*) they reflect cell polarity. The larger, usually more numerous proximal chromocenters are on the nuclear membrane in the region of the active division pole, and the smaller, less numerous distal chromocenters are located at the opposite, less active pole.