a standard diet were used. The acceptance of one diet for many species could greatly simplify feeding problems for the biologist who uses a great variety of biological species and might make the work more acceptable from the viewpoint of insuring a well-fed subject. It would also facilitate the introduction of new species into the laboratory. Such a diet could be useful in a search for unknown nutritional factors; a species that fails to perform properly when fed this diet may be presumed to require an unidentified factor. This diet could appropriately be used to learn how far principles of nutrition may be applied in the complete range of biological material. Nutritional adaptations could then be better understood and eventually predicted. Nutritional similarities and differences between species, as expressed in terms of a common diet, might indicate the path of nutritional evolution and complement the work being done in comparative biochemistry and morphology. The concept of the universal diet should give proper perspective to the place of nutrition as a common denominator of biology (*4*).

References and Notes

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4. Acknowledgment is made of the helpful criticism offered in the preparation of this manuscript by G. M. Briggs, C. A. Elvehjem, R. Lawrence, C. G. King, A. G. Hogan, T. H. Jukes, T. Just, L. A. Maynard, H. H. Mitchell, and J. R. Reyniers. Experimental examination of this thesis was begun while I was a member of the faculty of the University of Notre Dame.

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Communications

An Instrument to Simplify Bone Drilling and Injection

There has been a need for an easier and quicker method for penetrating bone structures when intracerebral inoculations are made into animals. The present methods of trephining or cutting the skin and drilling are tedious and time consuming.

During the course of work involving a large number of monkeys, an instrument has been devised for simplifying the technique of making intracerebral injections. The instrument is shown in Fig. 1. It is a stainless steel cup *C* with a hole *B* through the bottom and with two needle-sharp stainless-steel pins *A* attached to the bottom, one on each side of the hole. The size of the hole is determined by the size of the drill bit that is needed for penetrating the bony structure. In our laboratory we use a No. 60 bit in a portable electric dental drill. The size of the steel cup is determined by the size of the drill chuck and of the syringe. For work with monkeys, the internal dimensions of the cup C are ¾ in. in diameter and ¾ in. deep, and each pin is placed 5/32 in. from the center of the hole with the point protruding 3/32 in. from the base of the cup.

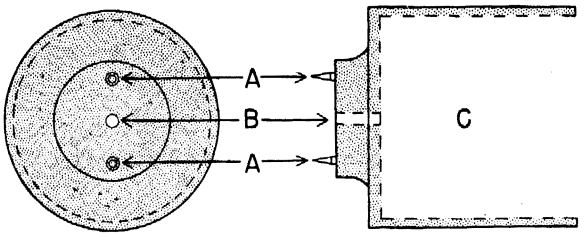

Fig. 1. Bone drilling and injection device.

Before use, both the instrument and the drill bit are sterilized. For making intracerebral inoculations into monkeys, the hair on the head is cut as short as possible with an electric clipper. The skin is then sterilized with iodine solution followed by a 70 percent alcohol rinse, and the instrument is placed firmly against the head of the animal so that the pins penetrate the skin and rest on the skull bone, thus securing the instrument and the skin so that both are immobilized. The bit of the electric drill is then inserted through the hole of the instrument, and a hole is drilled through the skull bone. After the drill bit is removed, inoculation into the brain is made through the same hole.

This instrument has been used on approximately 500 monkeys in which two intracerebral injections of 0.5 ml each were made—one injection into each hemisphere of the brain. By using two operators, one handling the drill and the other the syringe, the time required for drilling the two holes and making the injections average about 1 min for each monkey. Occasionally, some difficulty was encountered in inserting the needle through the hole in the bone. However, a second application of the drill was adequate for obtaining free access for the needle to the soft tissue under the bone. This instrument may be adapted with only slight modification of cup size to fit any hand or electric drill. It should be extremely useful to anyone interested in bone-drilling operations where fixing the location of the drill hole is important for subsequent operation. It can be adapted for use with any species of animal.

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