

the parietals is increased and the plane of the interparietal bone and the supraoccipital portion of the occipital bone is more vertical than normal. Reversed sutures and accessory bones may occur in combination with the ridge condition.

The conformation of the skull is extensively altered in the dome variation. The vertex of the normal skull is in the frontal suture between the frontal eminences and, posterior to it, the slope of the calvarium is continuous except for a slight depression at the bregma. In the dome skull this slope is interrupted by the angular union of frontals with parietals, and the vertex is at the bregma. Frontal eminences are absent and the posterior supraorbital processes show a marked lateral curvature with their extremities in contact with the anterior tips of the temporal lines. Parietal bones are flattened with inconspicuous bosses and form more posterior walls than roofs of the cranial cavity. The plane of the interparietal bone and the supraoccipital portion of the occipital bone is less vertical than normal.

Particularly interesting is the skull possessing both ridge and dome features. The sagittal and coronal sutures are fused, and the angular union of parietals and of parietals with frontals produces a sharp raised peak, the apex of which is formed by the bregma. Parietals are extremely flattened and may be slightly concave. The inclination of the interparietal and supraoccipital bones does not differ appreciably from the normal. This is the peak skull.

When unilateral, the dome condition causes a complete loss of symmetry and a bending of the whole skull toward the affected side. The parietal and frontal bones are shorter and the nasal bone longer in antero-posterior extent on the dome side, and the arches of the normal side are accentuated. The sagittal and frontal sutures, instead of forming a straight line between the lambda and nasion, describe a curve convex toward the normal side. The contour of the interparietal bone is definitely changed, the portion on the affected side being much larger than that on the normal side. The position of the bone is also altered, its plane facing posterolaterally rather than directly posterior as in the normal skull. The cutting edge of the upper incisor teeth is sloped due to a gradual shortening toward the dome side. Fusion of the sagittal suture may occur, causing increased flattening of the parietal on the dome side and decrease in the arch of the other. A reversed suture or an accessory bone may occur opposite a unilateral dome. Both of these combinations increase the distortion and accentuate the lateral curvature of the skull.

While these descriptions deal largely with the calvarium, it may be pointed out that the base of the skull and the cranial cavity are subjected to altera-

tion and there is some evidence to indicate that the brain may be affected by these changes.

With reference to the inheritance of this group of skull variations, the conditions described as "reverse suture," "accessory bone" and "fused suture" are inherited as distinct entities. They show some variation in expression, but, in general, they are recessive to the corresponding normal condition and are either definitely expressed or absent. They are also differentiated into right and left sided characters, as indicated above, and may occur in any combination with normal characters or with other variations, but certain combinations are of more frequent occurrence than others.

The precise combination of genetic factors which produces the ridge, dome and related forms of skull is still uncertain. The typical ridge skull is comparatively rare and little is known concerning its breeding characteristics. The dome skull, from which all other variations have been derived, does not breed true in all cases, and the series of characters derived from one parent by hybrid matings may differ in some respect with those derived from another. The problem is further complicated by the wide-spread presence of factors for one or more of the characters concerned in the production of the more complex types. The implications of these findings are clear.

Genetically, the importance of the observations recorded lies in the fact that a profound variation in the form of the skull can be transmitted, unaltered, from parent to offspring; by crossing an animal possessing a skull of this type with a normal, the original variation can be resolved into a group of component parts which bear little or no resemblance to the original condition, but these are inherited as distinct entities; they are differentiated into right and left sided characters and can be recombined to form the parental type as well as new types which are capable of further transmission.

HARRY S. N. GREENE

WADE H. BROWN

THE ROCKEFELLER INSTITUTE
FOR MEDICAL RESEARCH,
NEW YORK, N. Y.

BOOKS RECEIVED

- BACHER, ROBERT F. and SAMUEL GOUDSMIT. *Atomic Energy States*. Pp. xiii + 562. McGraw-Hill. \$6.00.
BRIGHAM, CARL C. *A Study of Error*. Pp. xiii + 384. Illustrated. College Entrance Examination Board, New York.
CALDWELL, OTIS W. and GERHARD E. LUNDEEN. *An Experimental Study of Superstitions and other Unfounded Beliefs*. Pp. 138. Teachers College, Columbia University. \$1.25.
CAYLEY, NEVILLE W. *Australian Finches in Bush and Aviary*. Pp. xviii + 251. Illustrated. Angus & Robertson, Sydney, Australia.