SCIENCE

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THE BIRD ON ITS NEST.

BY MORRIS GIBBS.

ALTHOUGH many interesting points in relation to the nesting habits of our friends, the birds, have appeared, I have yet to see anything concerning the position which the prospective parent assumes while incubating. The subject has been of much interest to me, and in the past years many observations have been made, which plainly indicate that the proprietors of nearly all nests "have their exits and their entrances." Many there are, as the kingfishers, woodpeckers, and other species, which reach their eggs by a single opening or burrow, and these of necessity must emerge from the same source; but all seem to have a well-defined position in sitting, as we shall see.

All can remember the attitude of the domestic hen, turkey, or goose, and how rarely this position is changed; and with the wild bird the tendency to a shift is even less, for with barn-yard fowls we can alter their posture by placing a board in a variety of positions about the nest, but with the inhabitants of the wood any interference generally results in desertion. The robin when building her nest often tries how her brooding breast is to fit the growing structure, and this, too, when a bare, flat platform gives no indication of the elevated sides to follow. Later, the male sits in the forming cup, and speculates, probably, on the outcome of his efforts, and views the outlook from the crotch. During the four days of egg-laying the female is not on, or rather in, the structure to any extent, unless the weather is cold or wet, and she assumes almost any position. It is only after the duties of incubation begin, a period which lasts fourteen days to a dot, that the robins adopt a standard, shared in by each of the pair. The male, who shares in the duties of sitting, when going to take his trick, almost invariably flies towards his mate in the same path, and arriving at the back door, just as his feet are about to touch the edge, the female is seen to dart forward between the branches which comprise the front door. This front door, as I prefer to call it, is then really the exit, and toward it the incubating bird always points her bill. It never directs toward the tree-trunk, and generally points towards an open space in the foliage when in a thick-leaved tree or bush.

With all birds, so far as I am able to learn, the exit is a point of observation for the sitter, from which it can get a view of friends and foes. The owls and hawks from an elevated position can command a fine view of the surroundings. With all aquatic birds the sitter almost invariably occupies a position presenting toward the water. Shore birds, as the sandpipers, rest on their nests in a position to best view the stream or pond. Rails and gallinules face the water, the latter usually building so that they can plunge from their homes directly into their favorite channels. The loon, who builds, or rather forms, its nest away out from shore in a mass of vegetable matter, usually the foundation of an old muskrat's house, invariably faces the open, deep water. From that position it can slide into the lake at a second's notice. Anyone can prove this position of the loon by examining the premises when the owner is away. The nest proper is merely a trough-like depression, evidently formed by the bird's efforts at hollowing, rather than in building up the sides. This oblong depression is a foot and a half long and over ten inches wide, and the eggs are always placed from three-fifths to two-thirds of the distance from the front end.

In a large number of nests of the brown pelican, which I examined on an island in Indian River, Florida, all gave evidence that the old birds sat in one position, usually with the front to the water. It was interesting to note, that, although the very young birds, which occupied many of the nests, assumed no regular position, the larger young nearly all presented towards the shore.

In the case of ruffed grouse and quail, the position occupied while on the nest is invariably that which gives the best view of the surroundings from the more or less concealed retreat. Who ever heard of a grouse's nest where the old bird faced into the brush pile or toward the stump or log?

The arboreal sparrows, vireos, and many other smaller birds usually sit upon nests built on horizontal limbs, with the head from the trunk, and when the nest is much elevated the position is usually chosen so that the sitter will face the prevailing wind. Birds will nearly always, when on or off the nest, face the wind; and, if observations are taken, nearly all birds on the nest will be found in one position if a strong wind is blowing.

FOOT DEFORMITY AS THE RESULT OF UNSCIENTIFIC SHOES.

BY W. M. L. COPLIN, M.D., AND D. BEVAN, M.D.

IN approaching the subject of scientific foot-dress, one of necessity combats the traditions, experiences, and fashions of centuries. If we are to judge of the foot coverings handed down to us as relics from the courts of France, Spain, England, and Germany, we can but conclude that for an extremely long period of time, probably eight or ten centuries, the dressing of the human foot has been, even in the so-called civilized countries, but slightly different, and only in degree, from the customs of the followers of Confucius for thousands of years. Fortunately for art, unfortunately for the history of civilization, so called, the artist of olden as well as modern times has not copied, except in portraiture, the cramped foot, the narrow toe, the elevated heel, and the pinched instep, which have long accompanied the human foot. It seems reasonable to suppose, however, that the Roman artist and critic, and the Grecian as well, fully attempted to give us the perfect foot as found in the well-developed Grecian woman of the day. The sandals worn at the time when Rome was in her splendor were undoubtedly so constructed as to afford ample opportunity for the development of the foot, and exhibit the beauty of its conformation. The gladiators, if we are to judge of their physique by the rude representations which are handed down to us from their times, trained in extremely loose-fitting sandals, and

fought their battles in "shin buskins," rarely wearing any foot covering at all.

The first criminal step taken was that of lacing the entire shoe; this error led rapidly to the pinching of the foot, and in order to retain the foot well forward in the shoe the high heel became a necessity. This is not the histological reason why the high heel was first put on the shoe, but it is evident to the thinker that, with the narrow toe worn during the reign of Queen Elizabeth, it would have been practically impossible to have prevented excoriation and severe rubbing of the heel had the shoe remained flat; hence to prevent this the heel was elevated, and the foot shot forward to the toe of the shoe, and its return toward the heel prevented by the elevation of its posterior extremity.

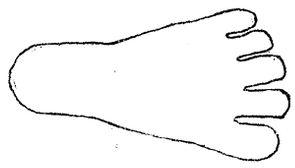


FIG. 1.—Infant's foot, never worn a shoe. Scale, three-eighths of an inch to one inch.

This can be but a brief *résumé* of the history of the improper foot-wear; it is sufficient to say, that, as fact, the wooden shoe or the cast shoe is more conducive to maintaining the normal contour of the foot than the pinchy leather shoe.

To return to the consideration of our subject proper, aside from the influence of evolution upon the human foot, we are to remember that the foot of a child as nearly represents the ideal of a perfect foot as anything of which we can conceive; so, taking that for a basis of our observation, let us glance for a moment at the essential features in maintaining the beauty of this small piece of God's handiwork.

As briefly outlining the course which the deformity of the foot pursues as the result of improper shoeing, the accompanying diagrams are presented. They are in no sense pictures, and are made by placing the foot upon paper and carefully tracing a continuous line around it; the same is true of the

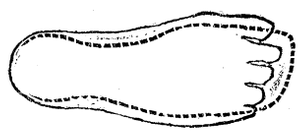


FIG. 2.—Five year-old child's foot, showing beginning deformity. Scale, two-eighths of an inch to one inch.

shoe except that it is drawn in broken lines. It will be observed that the broadest part of Fig. 1 is at the tip of the toes, that the toes are separated, that the pencil line can be readily made between the toes without displacing or pushing them aside. The foot is almost triangular in shape; from the tip of the little toe, a line projected backward will touch almost the entire length of the foot, and the inner margin of the big toe being continuous with the line at the side of the foot. The toes are straight, and when turned up, that is, fully extended, they will be separated from each other and evince perfect freedom of motion, both flexion and extention in all the phalanges. The instep is well arched, both on the plantar and dorsal surfaces; the foot is pliable; and, when extreme flexion is made, it will be manifest in the arch as well as in the toe; the heel is not found extending backward, it is round from above downward posteriorly and from side to side; there is no sharp angle, and the thickening of the plantar skin begins gradually. This foot has never worn a shoe, and therefore does not show any of the evidences of the slowly developing deformity. Next we will consider the foot of a child five years old (Fig. 2). It will be observed that the great toe is beginning to deflect towards its fellows; the little toe deflects slightly towards the inner side of the foot; the greatest width of the foot is no longer at the tip of the toes but at the metatarso-phalangeal articulation; the toes can be but slightly separated by voluntary effort on the part of the individual. The toes are beginning to show slight stumping, and the overriding of the little toe and of its neighbor is beginning to manifest itself. The foot, although fat and plump, has not the smoothness, softness, and roundness which the infantile foot possesses. A line drawn from the heel along the outer or inner margin of the foot but slightly touches the great toe or the little toe at its base, and neither of them at their first phalangeal articulation. The tracing of the shoe shows exactly how the foot must be compressed in order to adapt itself to the shoe; and it is to be remembered that these drawings were made upon the outside of the shoe, and the foot must go on the inside of the covering of which this is an outside tracing. The narrowing of the toes must inevitably follow this pinching.

Passing on to the next degree, we have that of an adult foot (Fig. 3). The deformity here is sufficiently well marked to speak for itself; a step further it becomes more marked, and reaches its climax in Figs. 4 and 5, where we have a later stage thoroughly represented. Here the great toe is overriden by

FIG. 3.—Adult's foot, showing increased deformity. Scale, one-eigth of an inch to one inch.

the second toe, which lies parallel with the third toe; they are stumped, with nails and sides flattened. The fourth toe bends under the third toe. The bend at the first and second phalangeal articulation is angular, and both angles are surmounted by corns. The little toe bends far under the fourth toe, and at the metatarso-phalangeal junctions of the small toe and of the great toe articular enlargements are well advanced. Lines drawn along the outer and inner margin of the foot no longer touch either the great or little toe. The heel now projects backward as a result of the lacing to which the ankle has been subjected. The foot is flattened in the sole, and in some cases enlargement will be observed in the tarso-metatarsal articulation of the great or, more commonly, the little toe. These changes, as represented by the above succession of figures, are but the history of one foot, if it could be followed from infancy to adult life or later. The skin of the sole of the foot will be thick, and in no small number of cases corns will be situated either upon the heel or internal or external ball of the foot. During the development of these deformities the gait of the patient — for by this time the sufferer is a patient either of the doctor or the chiropodist — will have materially changed. Instead of the free, swinging gait of childhood and youth, easily and comfortably maintained, we have now the mincing, narrow gait with evident unsteadiness in the ankles, a tendency to prevent pushing forward of the foot and a manifest effort required in ascending or descending stairs or steps. There is a poorly developed calf as a result of the heel being highly elevated. The leg is narrow and flat; the calf is deficient and the tendo-achilles prominent. Climbing stairs, or go-

ing up hills, or working bicycles or pedals, or standing on tip-toe, or dancing, tires out the calf, produces pain in the hamstring muscle and a weakness in the back. These conditions are not rarely ascribed to ingrowing toe-nails, corns, or a tender foot, while in fact they are the legitimate outgrowths of slowly developing anatomical deformities. Added to the improper shape of the shoe and its

FIGS. 4 and 5.—Adults' feet, showing the advanced stages of deformity. Scale, one-eigth of an inch to one inch.

poor construction, we have the element of bad leather with stiff inflexible joining, all going as important factors of the development of the deformity. The question of the arrest of these changes, the prevention of deformity, lies, of course, entirely in properly made shoes. The shoe should certainly be the same width from the metatarso-phalangeal articulation to the tip of the toe. Crowding should be prevented. The soles should be flat, no heels to jab the foot forward upon the toes. The weight should be transmitted directly to the plantar arch, and not to the ball of the foot. Stockings should be wide and not taper at the toes, having a uniform width as in the shoe from the ball to the tip of the toe; they should be seamless in the area coming in contact with the toes and soles, The texture of both the stocking and the shoe should be pliable, and neither should be worn long enough to become saturated with moisture.

PHONETIC VALUE OF THE *CH'I* GLYPH IN THE MAYA GRAPHIC SYSTEM.

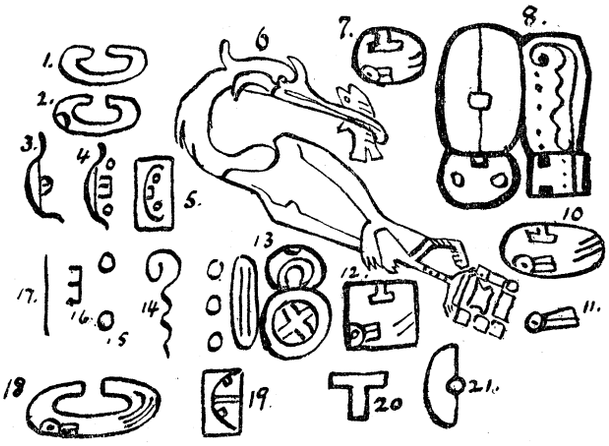
BY HILBORNE T. CRESSON, A.M., M.D.

THE *Ch'i* glyph, which figures so extensively both in the hieratic and demotic script of the Mayas, seems to have been used in the most archaic forms of their graphic system, as it appears in their altar tablets of Copan (see Fig. 3 of the illustration accompanying this article), and it is also to be remarked among the ikonomatic decorations of various ancient Maya cities.

Ch'i, in Maya, means "to seize" or "hold" with pins, thorns, or claws, or other sharp-pointed objects; this would be clearly ikonomatic for *Ch'ic* or *Ch'i*. In 1876, while in Paris, it was my good fortune to examine, at the library of the École des Beaux Arts, an excellent photograph of the tablet to the left-hand side of the doorway of Casa, No. 3, Palenque, which, in a previous article published in *Science*, I have suggested is probably a bas-relief of *Kukuitz*. The design and technique of this masterpiece of the Maya scribe-sculptor's art is especially fine, particularly the ikonomatic decorations which ornament the figure of the god. The head-dress of the figure represents feathers, maize leaves, the quetzal head, and other decorations, notably that of a heron (*Baac-há*) in the act of pinching a fish (*cay*) in its powerful bill. The suggestion of *Baac-há* in the act of pinching *cay* in its bill (Fig. 6), although it recalled by means of the various phonetic components of the crane's head, neck, and eye, that the scribe intended to suggest to one's mind *ha-ca-ba*, or *hach kabah*, or it may be *ah kaba*, also suggested that *ch'i*, "to pinch," "bite," was implied by the action of the heron's bill. It would make the sentence more complete, for the fish, *cay*, is, in fact, but a determinative, showing that *ch'á* is intended rather than *ch'i*, thus giving us "Ba-haá-chá" or "haá-chá-bá," an excellent rebus-like suggestion of *ah kaba*, which in Maya = "he who has a name." I notice that in the Casa, No. 2, tablet, Palenque, that the *main clouée* of Brasseur calls attention to "ah kaba," and a sculptured vase recently discovered in Yucatan, now in the Peabody Museum, has this same hieroglyph incised upon it in connection with other components which suggest *xma-kaba-kin* = "days without names." The so-called "nail-head" component of this glyph seems to have the phonetic value of *á*. It is absent, however, on the vase just referred to. In order to find out whether the *ch'i* glyph was used in other localities, a reference to Catherwood's drawing of the glyphs on the top of an altar at Copan, and various other sculptured tablets, indicates that it was used repeatedly by the Maya scribes. In one instance, at Copan, it recalls *Chikin*, the "west" or "sun-bitten." (Fig. 13).

The *ch'i* glyph has numerous variants, and seems to be accompanied by determinatives so as to indicate the vowel combinations, such as *chá*, *chā*, *ch'i*, *cho*, *chu*. We have called attention to a supposed determinative in a previous article published in *Science*, and one has already been referred to in this article. Where the glyph has no determinative whatever, as in Fig. 1, I accept it as *ch'*. If accompanied by the small circle, as in Fig. 2, I use it as *ch'i*. The sign of May orientation (Fig. 13), *Chikin*, the "west" or "sun-bitten," is an instance where this phonetic value has worked successfully. Where the *ch'i* glyph accompanied by two small circles (Fig. 15) placed on either of the tooth-like attachments (Fig. 16) which generally accompanies it, the phonetic value *ch'u* is suggested (see Figs. 4 and 5). Fig. 19 gives an admirable example of where two of the count-numerals are attached to the glyph; and, accepting it as a determinative, we obtain the phonetic value *ch'á*.

The *ch'i* glyph sometimes appears as shown in Fig. 18, and the resemblance of it to that of the day-sign, *manik* (Fig. 10), is striking. *Manik* has the same components,



only the outer line of the glyph encloses it completely, while in the *ch'i* glyyh the two ends of the pinching claw, or hand, are left open. Where it is closed we have a glyph formed, as in Fig. 20, which is not unlike the draughtsman's T-square, and seems to have the phonetic value *ma*. The T-square glyph (Fig. 20) is used at Palenque, small ventilators in the walls of one of the houses being shaped like it. At *Ch'i Ch'een-Itza* it appears as an ikonomatic decoration on the walls of a temple, and the small component (Fig. 11), so often used in the Maya glyphs, also appears as an ikonomatic decoration at *Ch'i, Ch'een, Itza*. Its phonetic