Pre-Columbian Representations of the Elephant in America.

By Dr. HENRY O. FORBES.

IN NATURE of November 25, December 16, 1915, and January 27, 1916, Prof. Elliot Smith set forth very circumstantially his reasons for supporting Von Humboldt in interpreting certain features of a Stela (known as B) from Copan in Central America, as a pre-Columbian representation of an elephant's trunk. This view was combated vigorously in NATURE of January 27 by three well-known American archaeologists, Dr. Spinden, Prof. Allen, and Dr. Stozzer.

FIG. 1.—Manabi slab. (After Saville.)

Elephant," seemingly "in confusion with the Indian Ganesa."

I do not claim to have made a special study of Central American archaeology, but I took the deepest interest in that of Peru during my sojourn there, and I have since followed with close attention any evidence tending to indicate culture-transfer between the two worlds.

The statements of Elliot Smith seemed on their appearance by their emphatically assured tone, supported by a drawing he gives of part of the Stela, apparently to afford evidence of a contact between East and West. Yet among many anthropologists, both in England and America, grave doubts have been expressed as to his interpretation of this feature of the monolith, owing to the extreme improbability of a totally alien mythology modifying successfully a very highly specialised and altogether different one, "including practically" (as Elliot Smith asserts) "the whole of the beliefs associated with" and the acceptance of "the worship of Indra."

During a tardy convalescence I have devoted some time to a careful study of the literature bearing on this point and of Dr. Maudsley's magnificent illustrations of the Copan monuments, without which it is impossible to form an opinion upon or criticise Elliot Smith's drawing in NATURE, November 25, 1915. The result is that I have arrived at an interpretation of the "elephant-trunk," different from his, which I submit to the consideration of archaeologists. The *motif* of the deity's long nose is certainly not an Indian or other elephant's trunk, nor entirely, though perhaps partly, a macaw's beak, nor probably a tapir's snout; but I suggest with some confidence it is a feature derived from one or other of the Cephalopoda—squid, loligo, argonaut, octopus,

or a combination of them. This suggestion, if accepted, will, I believe, help to elucidate much of the complicated emblems in which so many Central American sculptures abound.

The cephalopodous genera I have mentioned are all denizens of the eastern or western coasts of America, and any one of them might suitably be adopted as a motive in Maya mythology. Indeed an engraved stone slab from Manabi Island (Fig. 1), off the coast of Ecuador, shows that the squid (although here provided with spurious limbs) clearly entered into the mythology of that country, if not also into that of one or more regions of South America; for I found numerous cephalopod eyes and prehensile suckers from some specially large species in many of the pre-Inca graves I excavated in Peru. On the other hand, the elephant is entirely alien to America. No nation suddenly changes its mental orientation. "Mere similarity of ornament," as Mr. Joyce very truly remarks, "means nothing when the ornamentation in question is found to symbolise beliefs of an entirely different character."

It is perhaps desirable to recall the following characters in the cephalopods for purposes of the comparisons I have instituted: their long tapering serpentiform arms provided with rows of prehensile suckers; their very strong mandibles, so remarkably similar to a macaw's beak, conspicuous in the centre of their surrounding arms; their water-discharging funnel—often absurdly nose-like—opening on the mollusc's (frequently warty) body (or mantle) or between its arms; their immense round, staring, black, crescent-pupilled eyes, calculated to fascinate the superstitious and the timid. Some of the species inhabiting the west coast of America possess arms a score of feet in length and mandibles far larger than any macaw's—formidable and terrorising animals if unexpectedly encountered. Members of the ten-armed section of the group have two tentacles longer than the others, terminating in an expanded club arrayed with four rows of suckers.

My interpretation of the Stela will be more easily followed if I first direct attention to a lintel repre-

FIG. 2.—Serpent-bird, from Tikal. (After Maudsley and Joyce.)

senting the "serpent-bird" from Tikal, well pictured as Fig. 17, p. 55, of Mr. Joyce's excellent "Guide to the Maudsley Collection of Maya Sculptures in the British Museum." This lintel (Fig. 2), according to Prof. Elliot Smith, reproduces "a highly Americanised representation of the 'winged disc and serpents' [seen over the doors of Egyptian temples]." Here "the god's face now replaces the disc as in some of the Asiatic derivatives of the Egyptian design. . . . A striking confirmation of this interpretation (*i.e.* the conventionalisation of the serpent's 'body' into a simple cross) is supplied by Maudsley, who has shown that the pattern below the cross" (which I have

identified as the snake's body) "is really a very highly conventionalised serpent's head reversed." It is with great diffidence that I venture to differ from so distinguished an authority on Central American archaeology as Dr. Maudsley. If, however, he and other interested archaeologists will follow the interpretation I submit here, I hope it may prove as convincing to them as to myself.

The interpretation which I would submit is: The Tikal lintel represents, in its central part, neither more nor less than a slightly specialised argonaut or octopus, with its beak displayed in the centre of its radiating tentacular arms, representing the "god's face." Over it two round eyes glare out under a strongly marked corrugated "superciliary ridge." This ridge is the fleshy upper margin of the mollusc's mouth, which continues into its under-margin, formed by a fleshy band, seen resting upon two avian tarsi and toes. This lower fleshy oral border, marked by three circular pedunculated discs representing contracted tentacles on the margin of the mouth, gives origin, right and left, to a clearly defined tentacle, on which are depicted the prehensile suckers of the mollusc in the form of raised circular knobs, and terminating in a hook-like tip. On right and left the oral marginal angles are largely concealed by what may be termed "ear" ornaments (with their pendants), from behind which issues, on each side, a long massive arm, extending horizontally in somewhat angular undulations until it reaches the commencement of the conspicuous feathered extremities of the lintel, where it bends downward and outward, and ends in a hook-like tip (as in the long arm of *Rossia*). Along its length is sculptured an interrupted series of round elevated discs, representing prehensile tentacular suckers.

Starting from the same point (but in front of this larger tentacle) there can be identified another arm, coiling downwards, with a serrated margin towards its termination, and displaying the usual suckers, coiled end, and characteristic hook-like tip. Immediately above the "ear" ornament a very short, closely coiled-up, contracted arm takes origin from the margin of the mouth, while a stage higher on the lintel is seen stretching upward a very prominent arm serrated on its under margin (as in some living species), broadening towards its free end, and exhibiting conspicuously the usual suckers. This tentacle arises on each side out of the black-edged upper oral margin of the mollusc above the eyes, while from behind it arises yet another, easily traced by its suckers. This latter extends horizontally in the background (having attached to it the wing-coverts and quills of the feathered extremities of the panel) as far outwards as the curious mace-like objects (seen at the inner edge of the feathered area), where it descends in a wide sweep in rear of the longest horizontal arm, to terminate in a scroll which appears below its lower border in a double-hooked tip. Above the flat-ended arm still another, short and closely coiled, takes rise. Its prehensile suckers begin, in a row of circular knobs, beneath the centre of the "chin" of the small central face, on the upper edge of the lintel, and continue onwards (beneath a space-filling detail) along the coil of the tentacle. Finally, behind this detail on each side arises an arm more robust, stumpy, and even "elephant-trunk"-like than the others, the prehensile suckers of which follow along both "cheeks" of the small "face." In all, seven pairs of tentacular arms surround the parrot-mandibled mouth of this design. The digits of the avian foot beneath the lower oral boundary belong to the bird the feathers of which form the terminal ornaments of the lintel. One can easily imagine that the Maya artist, finding a marine

creature with a beak so macaw-like, would feel impelled to add some avian concomitants to his sculpture. He obviously took as his model for them the bird on the relief in the Palenque Temple of the Foliated Cross (Joyce's Guide, Fig. 13).

The lintel, therefore, if these interpretations be accepted, represents not "a serpent's head reversed," but an octopus with its beak displayed, as in *Nature*, amid its tentacular arms, and should be designated rather a feathered octopus than a "feathered snake." In any case, this sculptured design presents in no detail the remotest suggestion of an elephant or, to my vision, of a serpent, nor does it owe any inspiration to Egypt, India, or Asia; it is purely of Maya origin.

If, bearing in mind the interpretation above suggested of "the arms," "tentacular discs," and "body outline" in the "feathered snake," a close examination be made of Plate V. of Mr. Joyce's Guide where the head of the Death-god is pictured, I venture to think a strong confirmation of a cephalopod being a Maya motive will be admitted, for upon it (Fig. 3)

FIG. 3.—Head of Death-god, face of altar-table, Copan.
(After Maudsley and Joyce.)

two squids quite unspecialised are clearly sculptured. The "face of the god" anthropomorphised in having human teeth conspicuously exposed by the absence of fleshy lips, takes the place of the parrot-beak of the mollusc, and is completed by a nose with two nostrils—probably derived from the sepulchre of the cephalopod, the function of which would be unintelligible to the artist. Deep set beneath a strong "superciliary ridge" are two organs, which seem to be eyes. Yet they more probably represent the large tentacular suckers of the two massive fleshy arms curving up under them, recalling the stumpy tentacles of the Tikal lintel. I lean to the second alternative. If this be so, then the two prominent organs at the upper edge of the altar-face are to be identified as the god's eyes. The "superciliary ridge" forms the margin, fringed with short retracted tentacles, of the monster's body (the continuation of which probably extended over the altar-table), as well as the upper margin of its mouth. Of these small fringe tentacles, one is seen on each side of the "nose." The sulcus between them corresponds with a corrugation observable between the eyes of the "feathered serpent," and helps to support my suggestion that the dark line on that panel also indicates the upper edge of a cephalopod's mouth. Similar circular tubercles, on what are plainly the mollusc's mantle, occur also on the body of the squid carved on the Manabi slab (Fig. 1) already referred to, where there is no question as to its zoological identity. Close examination of the panel reveals on the extreme right of the "superciliary fringe" the trend of the edge (indistinct on the left side) of the oral orifice which, passing behind the robust arm, reappears below as the lower margin of the mouth—scalloped (by retracted tentacles) and "warted" as on the

higher part of the mantle—passing underneath what may be called mandibular teeth, then continuing upward to meet the mantle on the left side and complete its oral boundaries. It will be noted that the Maya conventionalism for representing the dermal surface of cephalopods is by circular tubercles. These are observable here on the surface of the body, on the notch of the "nose," on the "lip" between the

FIG. 4.—Stela B. Front. (From Maudsley's photograph.)

"nose" and the upper teeth, on the two robust tentacles, and on the lower oral margin. In the argonaut, the two central arms, when all are spread, are often so closely apposed as to appear a single very broad tentacle—a feature very conspicuous in the South Atlantic Bathypolypus.

My interpretation, therefore, of the morphology of this panel is that the whole of what forms here the "face" is delineated upon a much broadened tentacle, emanating centrally from the mollusc's body, so as to overhang and conceal its true mouth, where would naturally be seen its parrot-like mandibles, as in the "feathered serpent." The space to right and left of this broad, face-fashioned tentacle, is filled in by an unmistakable species of squid, the lower end of which rests on the base of the panel, while its oral end gives rise to a circle of prehensile tentacles, two coiling downwards and more than one upwards, while the central line of its mantle is marked by a row of circular warts, as on the Manabi slab (Fig. 1). A tentacle marked with suckers is coiled round each end of the bar over which the cephalopod is apparently holding on, disjoined possibly from its continuation on the altar-table. The right and left extremities of the panel are ornamented by an oblong detail, which I should not hesitate to determine—if asked to do so—as the eye of a large species of Ommatostrophes.

This altar-face panel, I argue, supplies the key to the intricate and foliated ornament in many Maya sculptures, in that the details are traceable to cephalopods of perhaps more than one species—indigenous emblems at all events, in which there is not the slightest suggestion of anything proboscidean.

Coming now to the Stela B, "famous for the realistic representation of the Indian elephant at Copan" (of which Prof. Elliot Smith, in his "Evolution of the Dragon," has reproduced a *front* view Fig. 19 from Dr. Maudsley's plate 36, in the volume on archaeology in Godman's "Biologia Centrali-Americana"), we may compare the intricate details of the monolith with those in the two panels discussed above. If, however, the right and left front edges of the Stela had been figured, a full view of both "trunks" and other important details, not visible *en face*, could

have been more instructively studied. Dr. Maudsley's photograph (in the "Biologia") is accompanied by an elucidatory diagram to render the intricate decoration of the stone more easily followed. This diagram does not, however, quite faithfully reproduce the sculpture, and as its upper portion has been used by Elliot Smith to illustrate his letter in NATURE of November 15, 1915, it is very misleading, as will presently be noted.

The feature, on both "trunks" (Fig. 4), interpreted as a nostril, due to the ignorance (?) of the Maya artist, is clearly in its shape and more or less accurately as to its position a cephalopodous eye, like that of *Sepiola*, situated, as it should be, on the animal's body or mantle. Turning attention now to the right-hand upper corner of the statue, we discover there Elliot Smith's "auditory meatus." On the left of the "trunk" is (as the photograph, Fig. 5, sufficiently testifies) a tentacular arm issuing from a fold of the mollusc's body (the "forehead" of the elephant) and so coiled up as in *Rossia* that it ends in a close circular spiral, armed throughout its length with its rows of prehensile suckers. On the right of the trunk the origin of this coiled-up tentacle ("auditory meatus") is concealed by a flamboyant bouquet of tentacles, the suckers of which are nevertheless to be seen between and behind the flambeau. This "scroll" below the ear as well as the tree-like appendages above the head, are in Elliot Smith's view "parts of the conventional waves breaking around the *sea-type* of Indian Makara." Yet the elephant of the Stela is a mahout-riding species! I feel convinced, nevertheless, that the "ear-pinnae" of Elliot Smith (arising from behind the bar-like detail on which are seated the two human figures visible on the front aspect of the monolith) are undoubtedly cephalopod arms recalling those of *Cledone*. They coil round beneath the "meatus" tentacle, and end in a sharp thorn-like tip (as in *Rossia*) projecting conspicuously from the plane of the Stela—surely an unusual appendage to an ear-flap. These tentacles, as drawn in the

FIG. 5.—Stela B. Right-hand edge. (From Maudsley's photograph.)

elucidatory diagram, unfortunately show none of the suckers definitive of their function, though they are clearly represented in the photograph. Above both these details another (rather damaged) tentacle can be traced at the summit of the monolith on each side, coiling upwards and inwards from a fold of the mollusc's body (the "elephant's" head)—none of them analogous to any organ in a proboscidean.

Studying now the corresponding angle on the left side of the monolith (Fig. 6) we see a bodyless turbaned head poised on the mollusc's body (the "elephant's" neck). This is interpreted by Elliot Smith as a mahout. On the elucidatory diagram are delineated

this driver with his braceleted hand and bent arm resting on the "elephant's forehead," and also the edge of his so-called "driving-stick" and the tips of his fingers. The Stela, however, shows absolutely no such features. Were the arm correctly drawn in the diagram, it must originate from the driver's ear, for he has no fragment of a shoulder, no body, no arms or hands—a head only—the braceleted wrist and arm are imaginary. Underneath the "mahout's" chin originates (as on the corresponding dextral aspect) a

FIG. 6.—Stela B. Left-hand edge.
(From Maudsley's photograph.)

tentacle as a closely coiled spiral (again the "auditory meatus") with its prehensile suckers. More to the left the mollusc's body gives off a second tentacle, which meets a third, coiled up reversely, all of them armed with prehensile suckers. The ridge seen in the front view, under which the bent arm of the rider is drawn in the diagram, is clearly the fleshy edge of the mollusc's body, corresponding to that on the right side of the "trunk" on the right corner. From the body of the cephalopod, just beneath the "rider's" chin and above the eye which is overshadowed by it, there clearly originates from the mollusc's body a more slender tentacle, overlaid upon the "trunk," the function of which is denoted by its prehensile suckers. How erroneously this detail has been interpreted as a mahout's driving-stick—which he has no arm or hand to hold—an inspection of the photograph of the Stela itself, our sole witness, proves. The right-hand "trunk" carries no mahout and shows no "driving-stick."

Both the "trunks"—neither of which, by the way, is accompanied by tusks although Elliot Smith refers to such a feature—are, therefore, but very large robust tentacles (one enlarged tentacular arm is not an unfamiliar character in living cephalopods) the suckers of which are indicated by the cross-hatching instead of by the usual circular tuberculations, confusing perhaps macaw with cephalopod emblems. The mollusc's body, therefore, gives off around the "trunk" and "head" quite an array of tentacular arms which cannot be associated with anything in proboscidean anatomy. The supposed mahout is not the only human figure on the Stela. Two are seen in the front view, sitting between the two "trunks"; while down both its front edges, below the level of the "trunks," is sculptured a series of figures, or only heads, all of them on the Stela itself, turbaned as in the Rain-god, but none of them showing any proboscidean relationships. They have neither "trunks" to sit on nor "sticks" to drive with. If they are not mahouts, neither may the uppermost figure (seated on the mollusc's mantle) be so interpreted. As this supposed "driving-stick" turns out to be a cephalopodous tentacle, *cadit questio*, both as regards the trunk and the mahout.

Moreover, the turban of the "Rain-god" presents a most suggestive and interpretative "ornament." This symbol—if the two panels already discussed be kept in mind, especially that representing the Death-god—clearly represents a cephalopodous animal. On each side (the right broken) of the turban (Fig. 4) there hangs down an octopod (?) tentacle, with its

free tip exactly recalling that of the longer arm in the "feathered snake" and of Argonauta or Rossia, both showing the usual circular tuberculations representing prehensile suckers. On the top of the turban and on each side a second suckered tentacle is coiled, while rising perpendicularly from the centre of its crown is seen what is quite easily resolvable into two tentacles, armed with suckers, closely applied edge to edge, as in the argonaut, but diverging half-way up to embrace a "cartouche" enclosing emblems quite in keeping with the motive—three prominent suckers, then still ascending to end in a lingulate finial.

That the cephalopod motive is a real one in South American mythology is evident from the Death-god panel and the Menabi slab; but further confirmation comes from the presence of at least one unmistakable cephalopod in the centre of the beautifully decorated reverse of the monolith (Fig. 7), where it gives off two downward coiled tentacles and two long upwardly directed arms with their characteristic terminal hook and prehensile discs. Cephalopodous emblems run riot indeed over the statue on all its sides, while not a single detail (except the mistakenly named "trunks") recalls anything in the anatomy or life of an elephant of any species, or of any creature alien to America.

It is possible, from my point of view, to interpret in the same sense the emblematic decoration in more than one of the Copan mythological designs—to name only two: the left upper vignette on the Dresden Maya Codex (Fig. 11, Joyce's Guide); and especially the left glyph in the upper row of his Fig. 6 of "Full-figure Numerals." I may add also the glyph figured by Dr. Spinden, Fig. 1, c in NATURE of January 27, 1916, which is combined with the macaw motive.

In his letters to NATURE referred to above, Prof. Elliot Smith avers that the scroll (representing the pinna) "was an essential part of the elephant design before it left Asia"; that "the sculptor was not familiar with the actual animal"; that he "has mistaken the eye for the nostril and the auditory meatus for the eye"; has represented "the ventral

FIG. 7.—Stela B. Part of the reverse of the monolith.
(From Maudsley's photograph.)

surface of the trunk in a conventionalised manner without any adequate realisation of the true nature of the features he was modelling"; and that "having converted the auditory meatus into an eye he converted the pinna into a geometrical pattern" which "he was careful to restrict to the area occupied by a relatively small pinna that is distinctive of the Indian species." Yet, notwithstanding these many defaults of memory which are charged to the Maya sculptor,

one cannot fail to marvel that he could draw the outline of the head so accurately as to enable a zoologist to identify the original model as the Indian species and to distribute its various errors with so much acumen.

Elliot Smith's ardent supporter, Mr. Perry, provides us with a fact that increases still more our amazement: the "movement of culture," he tells us, "that set out from Egypt" [always as stressed by Rivers without their women folk] "about the beginning of the fourth millennium B.C., ultimately landed in America [after centuries spent in India, Indonesia, and Polynesia] about the beginning of our era and there founded civilisations essentially the same as that of Egypt in the Pyramid Age. . . . This movement took 3000 years, more or less, to accomplish the journey, but it can be traced with fair accuracy for thousands of miles." It is therefore scarcely surprising not only that the god Indra was confused with Ganesa and that certain features—nose, ear, pinna, turbaned rider—of the elephant head during that period became but a memory to the bearers of the heliolithic civilisation to America, but that any resemblance even of the outline of its (tuskless) head and the appropriateness of a "driver" were so well conserved, especially as Elliot Smith

assures us that the motive on the Stela was not the land elephant but "the sea-elephant design of the mythical Makara [a snouted monster with large prominent tusks and a fish's tail, which never existed on land or sea, and never carried a mahout] which was the commonest form of elephant spread abroad by the sea-men of Southern India copied from an earlier model (or *picture*, according to Elliot Smith) [made thousands of years before] by some immigrant from Asia." Imagine a picture—on what material soever depicted—surviving all these millenniums among a people who were only "food-gatherers" in the palæolithic stage when the heliolithic missionaries arrived among them!

Which is more likely to have inspired the Maya sculptor, a mythical animal, the memory of which 3000 years must have paled to obliteration, the outlines, moreover, of which had never been seen by any human eye; or creatures familiar to him in his own seas, which must have excited his dread, and aroused his artistic sense?

I have to acknowledge Dr. Maudsley's photographs in the "*Biologia*" as the source of the above figures, and his kindness in permitting me to use them, and to thank Mr. J. Edge-Partington for sketching Fig. 1 for me.

The British Medical Association at Bradford.

TISSUE CULTURE.

AT the ninety-second annual meeting of the British Medical Association held at Bradford on July 22-25, Dr. Alexis Carrel, of the Rockefeller Institute, New York, opened a discussion on the method of tissue culture and its bearing on pathological problems. The present position of tissue culture *in vitro* was clearly summarised, and considerable space was devoted to the most recent view of American workers that there are growth-promoting substances—trephones—which are secreted by certain cells of the body to minister to the nutritive wants of other cells. It is believed that leucocytic trephones play an important part in physiological and pathological processes. They secrete substances, *in vitro* and *in vivo*, and enable fibroblasts to grow readily.

IMMUNITY.

At the same meeting, Dr. R. A. O'Brien, of the Wellcome Physiological Research Laboratories, opened a discussion on immunity, with special reference to specificity and the influence of non-specific factors. It is now a hundred years since the great French clinician Bretonneau, from a mass of observations, set free the doctrine of specificity in disease. His particular contributions referred to enteric fever and diphtheria. After long years of confusion, Dr. William Budd, in the 'sixties of last century, again placed the doctrine of specificity on a sound basis, both with respect to enteric fever and to tuberculosis. The exact experiments of Robert Koch from 1876 onwards established the specificity doctrine on an irrefutable basis, which was again extended through the discovery of antitoxin by Behring and Kitasato in 1890. Since that time every well-authenticated observation on man or animals has confirmed the specificity of infective virus.

It has been claimed, however, that certain substances which are non-specific in the sense that they have no direct or immediate affinity with the specific causes of disease, may act in a curative manner. It is the published data on this point which Dr. O'Brien has analysed. In certain instances he has subjected the question to experimental inquiry, and has been unable to find evidence that non-specific substances

influence favourably specific experimental infections or intoxications. Against this is a slowly growing mass of clinical observation, which seems to point to therapeutic successes in a variety of diseases. Protein substances such as occur in milk, blood serum, and egg are claimed to be endowed with curative properties believed to be great or even extraordinary. We have recently been asked to believe that injections of milk will cure duodenal ulcers.

Many clinical observations are without much value on account of their uncritical character and the complexity of the factors involved. This non-specific therapy may be a fashion in therapeutics. At all periods there have been many such. It is said that a new drug should be exhibited while it *still* cures. It is also well not to forget that medicine still retains many of the characteristics which it had nineteen hundred years ago, when Celsus wrote, "Medicine is a conjectural art, and the nature of conjecture is such that although it answers for the most part, yet sometimes it fails."

THE MICROSCOPY OF THE LIVING EYE.

When von Graefe first saw the fundus of the living eye with Helmholtz's ophthalmoscope in 1858, he is said to have exclaimed, "Helmholtz has unfolded to us a new world! What remains to be discovered!" Indeed it is questionable whether any single physical invention has been a greater boon to medical science than the ophthalmoscope. The latest development of ophthalmoscopy is the microscopy of the living eye, the technique of which has been elaborated by several ophthalmologists, but chiefly by the celebrated Allvar Gullstrand of Uppsala. Briefly stated, the method consists of illuminating the living eye by a narrow beam of light furnished by a nitra slit-lamp and condenser, and with diaphragms of various small apertures. The details of the structures so illuminated are observed obliquely, either by the "teleloup" or Czapski's binocular microscope. The teleloup consists of a pair of miniature opera-glasses fixed on a spectacle frame. It gives a stereoscopic image with a magnification of about two diameters. With the microscope, nine diameters or more of magnification can be obtained.