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3. For detailed descriptions of the apparatus, thermode, and data on the interaction of skin and hypothalamic temperatures in the control of physiological and behavioral heat loss responses in the rat, see J. D. Corbit, in preparation.
4. I thank E. La Bossiere for preparing the anatomical material. The animal was perfused with isotonic saline and neutral buffered Formalin. The brain was embedded in celloidin and sectioned at 30 μm. Alternate sections were stained for fibers and cell bodies.
5. H. T. Hammel, D. C. Jackson, J. A. J. Stolwijk, J. D. Hardy, S. B. Strømme, *J. Appl. Physiol.* **18**, 1146 (1963); J. D. Hardy, *Harvey Lect.* **49**, 242 (1953–54).
6. This model for the control of behavioral thermoregulatory responses ignores the possible roles of influences other than skin and hypothalamic temperatures. For example, inputs from extrahypothalamic core temperature receptors such as those in the midbrain [J. D. Hardy, *Fed. Proc.* **28**, 713 (1969)] or in the spinal cord [E. Simon, W. Rautenberg, R. Thauer, M. Iriki, *Naturwissenschaften* **50**, 337 (1963)] are not included in the model, because their behavioral significance is not yet known.
7. An estimate of T_{s_0} was obtained empirically by increasing ambient temperature from 30°C at a rate of 0.3°C per minute, and determining the value of T_s at the moment when the animal first pressed the lever to reduce ambient temperature to 29°C; $T_{s_0} = 36$°C. The T_{hy} was free to vary and approximately 39°C during these tests. The estimate of T_{s_0} is needed to estimate T_{hy_0}, the *x*-intercept when $T_s = T_{s_0} = 36$°C; $T_{hy_0} = 39$°C. The constant *a* is simply the average slope constant obtained by the method of least squares; $a = 4.6$ and 1.1 responses per 20 minutes for 1°C for rats T7 and T9. Given estimates for T_{s_0}, T_{hy_0}, and *a*, it is possible to solve for *b*.
8. For example, the constant $b = 0.225$ for the control of sweating in man [J. A. J. Stolwijk and J. D. Hardy, *J. Appl. Physiol.* **21**, 967 (1966)]. The relative importance of skin temperature in the control of evaporative heat loss in the rat is not yet known.
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10. Supported by NIH research grant MH-16608.

4 June 1969; revised 17 July 1969

Controversial Taxonomy of Fossil Hominids

Leakey, Protsch, and Berger (*1*) included, in a table, four questionably valid names for fossil hominids. Later Brace (*2*) questioned the continued unqualified use of two of these names, "*Homo leakeyi*" and "*Homo habilis*," and Leakey *et al.* then replied (*3*). A few further comments seem warranted because Leakey *et al.* have not really answered Brace's criticisms.

Concern over the citation and justification of "*Homo leakeyi*," a name founded on Olduvai hominid 9, is warranted because any further use of this name is an error in view of its originally having been proposed conditionally. In 1963 Heberer (*4*) remarked: "Als Vorschlag, der nicht vorgreifen will, möge die folgende Benennung gewertet werden: 1. *Homo leakeyi* n. sp. oder 2. *Homo erectus leakeyi* n. subsp."

According to the *International Code of Zoological Nomenclature* (article 15) names proposed conditionally after 1960 have no taxonomic validity and are to be considered *nomina vana* (*5*). Irrespective of the name's being invalid on this technical point, however, the *calvaria* itself appears to differ from Java man (*H. erectus*) no more than does Pekin man (*H. erectus*). In 1966, after "*H. leakeyi*" was conditionally proposed, Leakey himself (*6*) referred to this *calvaria* as *H. erectus*. Evidently Leakey has now changed his position again because Leakey *et al.* in their reply to Brace have omitted the name "*Homo leakei*" from their Table 1 which they say indicates their "own choice" of names for the fossils in question. Unfortunately, however, if these authors no longer intend to use "*Homo leakeyi*," the (apparent) substitution of the term "*Pithecanthropus* sp." can hardly be considered an improvement. This latter genus is now almost universally accepted as a junior synonym of *Homo*.

The validity of "*Homo habilis*" poses a more complicated problem which can only be touched on here. The two papers cited by Leakey, Protsch, and Berger, in our opinion, do not go a long way toward answering any challenge to the validity of "*Homo habilis*," if for no other reason than their having failed to treat adequately the objections raised by Robinson (*7*). In fact one of these papers supposedly validating the name (*6*) makes no reference to the type specimen of "*Homo habilis*." Three points about the "*Homo habilis*" material remain to be convincingly demonstrated. These are (i) that the type mandible (Olduvai H. 7) and other material from bed I (Olduvai H. 8) samples a population which is specifically distinct from South African *Australopithecus africanus* populations, (ii) that the bed II material should be referred to the same species as the bed I material, and (iii) that the bed I and bed II material whether taken separately or together should be placed in genus *Homo* and not in *Australopithecus*.

Some of the "unwarranted namegiving" referred to by Brace might have been avoided had the placement of the "*Homo habilis*" material originally been assessed rigorously. To this end we suggest that the following procedures be applied when the taxonomic position of new hominid fossil finds is under consideration:

1) The material should first be compared with the most closely similar, previously described species which are roughly contemporaneous with it.

2) If it is considered distinct at the specific level from these materials, the next step is to determine in which lineage the new species belongs.

3) The placement of a new species in a lineage having been determined, the problem remaining is to decide at which points within the lineage specific and generic distinctions are warranted. This is partly a subjective matter, but the range of variation within a taxon should be determined, where possible, by analogy to the range of variation within species and genera of present-day related forms. Where this scheme cannot be applied because of inadequate information, new specimens should remain unnamed, or be tentatively referred to prior taxa pending accumulation of more data relevant to their status.

The bed I "*Homo habilis*" material, in fact, closely resembles *Australopithecus* sp. from South Africa. The mandible and teeth are very similar to those of *A. africanus*. The parietals indicate a brain volume well within the calculated *Australopithecus* population range, but falling near the lower extreme of the calculated range for *Homo*. The hominid 8 talus (associated at the same site as the type of "*Homo habilis*") appears to have functional affinities with the Kromdraai talus, and these two are much more similar to one another than either is to *Homo sapiens* on the one hand, or to any pongid on the other (*8*). Likewise, the hominid 8 clavicle is said (*9*) to differ somewhat from the clavicle of modern man while indicating a range of movement at the shoulder joint similar to that indicated by the Sterkfontein scapula (*10*). Thus, though the question may still be open, the present evidence favors placement of the bed I "*Homo habilis*" material in genus *Australopithecus* and possibly in species *A. africanus* as well.

The bed II "*Homo habilis*" material differs from the bed I material in size and, to some extent, in morphological detail. In a number of these differing features the bed II material resembles *Homo erectus* (*11*), and its referral to the hypodigm of "*Homo habilis*" has been questioned on morphological grounds (*12*). In addition, the bed I and bed II materials come from different faunal zones and appear to be separated by a time gap which may be as great as 0.7 to 1.0 million years. The questions raised earlier by others cited here have never received satisfactory answers and continue to be valid objections to the concept of "*Homo habilis*."

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19 May 1969

Open-Heart Surgery and IQ

The case made by Honzik *et al.* for inferior IQ's in girls undergoing open-heart surgery (*1*) rests on the following results. They found a significant difference favoring the boys in WISC Verbal IQ, postoperatively, in a design which used the Stanford-Binet Test before and after surgery. Within-group sex differences showed that for the girls the WISC Verbal IQ of 95.8 was significantly less than the WISC Performance IQ of 99.5. These findings were coupled with the fact that on preoperative testing of *another* group of children undergoing open-heart surgery, the WISC Vocabulary test scores were significantly higher for the boys than for the girls.

The case of lesser IQ's in girls would be greatly strengthened if control groups were employed, if the research method employed only the WISC before and after surgery, and if replication of the study with appropriate control groups yielded the same results.

Use of control groups of children who are hospitalized for medical (nonsurgical) illnesses would equate for the factor of hospitalization, however short it may be, before IQ testing. Similarly, such patients would control for the effects of surgery and anesthesia which may well account for the first data obtained that favored the boys' IQ determined with the WISC after surgery.

Using the postoperative WISC finding to explain, even partially, later initial differences found with another group is not the best strategy, since neither research design seems to have been addressed to the problem of sex differences prior to surgery in children with cardiac and operable cardiac conditions.

Invoking the single significant finding that the Vocabulary test was higher with the second group of boys than the second group of girls is fraught with statistical risks. Assuming that at least nine other subtest and IQ scores were compared, the most that can be said for the finding is that it is worthy of further but well-controlled investigation. If the single difference were one of several measures of IQ testing, then the one result may be a chance artifact due to the numerous other comparisons that were made. In a pilot study of effects on intellectual functioning of surgery on aged patients, using a "young" group to control for the effects of surgery and an "old" medically ill group to control for hospitalization, we found but one measure impaired, the Digit-repetition test of the Wechsler-Bellevue, Forms I and II. However, this result was one of many comparisons computed, which included psychiatric ratings, Memory for Designs, Bender Gestalt test, Critical Flicker Fusion, Archimedes spiral, and others, which led us to replicate the study. In this replication, Paolino, Wolin, Salus, and Simeone (*2*) found that the promising difference in recall of digits did not hold up, although minor changes were found in motor functions, as Gruvstadt *et al.* (*3*) had found in their excellent study of induced hypotensive surgery.

Finally, the call for investigation of the effects of early environment, sex differences in family interaction, and the "sex-associated genetic factor" might well be deferred until the more parsimonious leads are pursued by replication with control groups.

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Paolino's point is well taken that replication of the study with different control groups would be desirable. Our purpose in writing the report was to stimulate just such investigations. However, we believe Paolino underestimated the consistency and probable validity of our findings for the congenital heart disease sample in his critique. We used carefully normed intelligence tests and considered the standardization samples, which resembled our sample, as the control. As can be seen in figure 1 of our report (*1*), the distribution of the Verbal IQ's of the girls undergoing open-heart surgery, with a modal IQ of 90, differs quite markedly from the standardization distribution. Not only were the girls' Verbal IQ's lower than those of the standardization sample but they were significantly lower than those of the boys. There is always the possibility that a significant finding is a chance finding, but there was great consistency in our results.

In the first analysis for 60 boys and 58 girls, we found that the girls did poorly on the Verbal subtests of the WISC: Information, Comprehension, and Vocabulary (all of which require