

a dynamic branch of functional anthropology is concerned, where the commonly biological aspect is combined with medical one.

In the following, we will try to throw more light upon these basic theses:

1. When determining the norms treating the basic somatic signs of a woman, it is impossible, in our opinion, to neglect the reproductive function. It is a matter of course in andrology that only that man is taken as normal who shows a normal spermogram. Somatic distinction of a man with normal activity of the gonads from an infantile or eunuchoid one is such as to provide a direct guidance for the clinician in establishing the defect diagnosis, as is shown by Hynie's school. The norm for women, if we exclude the gross deformation originated in whatever way, may analogically comprise all female individuals, if they were rendered pregnant in due time and have given spontaneous birth to a live newborn. That means we make the norm dependent on the fulfilment of the basic biological function of a woman.

Such a biological viewpoint is not an end in itself. Obstetricians, pediatricians, and forensic physicians need exact data concerning the correlations of weight, height, age, parity, weight increases, and their relationships to weight and length of the newborn. Exact physiological norms are required in studies relating to the effect of pathological gravidity upon the condition of newborns, such as gestosis tarda or gravidity endangered by bleeding.

In the course of pregnancy evident somatic changes occur in a relatively short period of 40 weeks, which may reappear several times in the course of a woman's life.

2. A highly interesting branch of anthropology are structural changes. Gravidity provides a unique model for the study of these changes. The first experience of a woman's organism with gravidity has a deep biological meaning. Some authors have expressed their conviction that it is only through the influence of gravidity that a woman matures physically. *Sit venia verbo* — terrain vierge is laden with gravidity in every respect, and the resulting somatic changes at the end of gravidity are important for the estimation of the condition of the individual structures. For female anthropology the subsequent question is of vital importance of how a particular type changes in the course of gravidity. Gravidity, which represents a natural stress, is thus a test for the lability or stability of the individual somatic structures, which emphasizes the importance of the preconceptional condition of the organism.

In the course of ontogenetic development the body weight increases both in men and in women. With the gravidity finished, the organism returns to values such as correspond to its age, deviations may be either positive or negative. These changes may also be of importance to criminalistics when identifying gravid women.

Changes in weight occurring after delivery will depend not only on the constitution, but also on various ecological factors.

3. The anthropology of maternity may serve as an available advantageous method for certain problems of physiology and obstetric pathology. Somatic changes occurring before and after gravidity can be expressed in terms of comparable anthropological factors: e.g. posture, development of musculature, increase of fat, the condition of the plantar arches, pigmentation, growth of mammae, growth of abdomen, and the like. Such data are necessary for the study of body composition, plasmatic volume and vasomotoric changes.

4. Anthropology of maternity completes the efforts of an obstetrician to maintain a sound woman and a sound foetus, the efforts that a woman may not suffer by gravidity even in the aesthetic respect. The bodily signs originating in the course of gravidity may then provide a good guidance to rehabilitation gymnastics during gravidity, which should meet with a far massive and favourable prophylactic response of our population.

5. In Czechoslovakia the ontogenetic trend has a steady place both in physiology and anthropology. Evolutionary anthropology necessarily needs to have its own basis even in the prenatal period. These data are of extraordinary significance in the treatment of the later consequences of an early dysadaptation, as occurs in prematurely born children, in children with low weight at birth, in children where gravidity was being accompanied by bleeding or manifestations of late

gestosis, in diabetic women, in hypertension diseases, and the like.

6. Anthropology of maternity can find application not only in individual observations, but also in ethnic anthropology. Taken from this point of view, gravidity is again a stimulus which affects through its genetically fixed signs all women without exception in various ecological situations. Methodically, gravidity could be used for solving a number of problems. The question is whether the somatic changes in the course of gravidity, and so also the somatic condition of foetus are more dependent upon the bodily mass of mother, or rather on racial distinctiveness. Concretely, for example, whether tall women from various populations will show a similar somatic adaptation in gravidity. A possibility also offers itself here to find a racial affinity in an analogous adaptation, and, on the other hand, to deduct the body-affecting ecological factors in the same race.

These were several remarks denoting the sectors the anthropology of maternity is related to. At present, when solving the task of "the adaptation of the organism to gravidity", we avail ourselves two ways completing each other. Big statistical sets allow us to determine the occurrence of basic indicators and trends. A set of individual prospective observations serves to trace the partial links of this complex process.

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DIE MESSUNG EINIGER HANDMASSE MIT HERIGS KONUS

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EINLEITUNG

Eines der Probleme, die den Gegenstand anthropometrischer Untersuchungen des Anthropologischen Instituts der Karls-Universität bilden, ist die Wachstumsdynamik der Hand

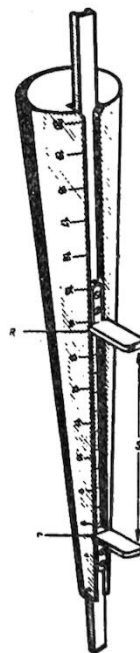


ABB. 1

Meß-Konus nach Herig zur Messung einiger Handgrößen

und der Einfluß der Arbeitsbelastung auf ihren Bau und ihre Form. Mit der Frage, wie weit die Hand durch die Arbeit beeinflußt wird, befaßten sich viele Autoren in den letzten 40 Jahren. Die Mehrzahl von ihnen stimmt darin überein, daß schwere Arbeit insbesondere die Breitenmaße der Hand verändert, während die Längenmaße gleich bleiben.

Der Zweck dieser Arbeit war es, festzustellen, ob sich die typischen Maße der Hand bei den manuell und geistig Arbeitenden voneinander unterscheiden. Die eingehende Beschreibung der Zusammensetzung beider Gruppen wird später angeführt.

Arbeiten dieser Art sind besonders für die Konstruktion geeigneter Handgriffe von Bedeutung. Um die Hände durch ungeeignete Werkzeuge so wenig als möglich zu schädigen, wurden von den Ärzten bestimmte Forderungen an die richtige Konstruktion der Griffe gestellt. Beim Halten des Griffes soll der Druck auf die Haut ganz gleichmäßig verteilt und die Handfläche soll maximal ausgenutzt sein. Die bei der Benutzung des Werkzeuges angewandte Kraft darf nicht zu groß sein, damit eine Überanstrengung der kleinen Muskeln der Hand und des Unterarms verhindert wird. Aus diesen Gründen erscheint es vorteilhaft, sowohl bei der Konstruktion von Griffen als auch beim Messen der typischen Handmaße statt der bisher üblichen zylindrischen eine (kegelförmige) Konusform zu verwenden.

Deshalb haben wir die Maße der Hand mit Herigs Konus gemessen, der einen Holzkegel mit abgeschnittener Spitze darstellt. An seinem Umfang ist eine Skala aufgetragen, an der man die entsprechenden Maße der Hand ablesen kann (Abb. 1).

Das eigentliche Messen

Der Vorgang beim Messen ist folgender: die gemessene Person nimmt den Konus so in die Hand, daß der Daumen sich an dessen breiterer Seite befindet. Den Konus umschließt sie so, daß die Fingerspitzen leicht die gegenüberliegenden Hautstellen der Handfläche berühren. Die Umschließung des Konus soll bequem erfolgen, nicht zu fest, damit die abgelesenen Maße durch den Druck nicht beeinflußt werden. Dann kann man zwei Maße ablesen: r — Radius der Kleinfingerseite und R — Radius des Daumenteiltes. Mit einem verschiebbaren Meßinstrument wird die Breite der Hand s gemessen, die die Entfernung der anthropometrischen Punkte metacarpale ulnare und metacarpale radiale darstellt.

Insgesamt wurden 182 Personen aus Prag untersucht, darunter 83 Männer und 99 Frauen. Bei jeder Person wurden die drei erwähnten Maße festgestellt, ferner Alter, Beruf, eventuelle Verletzungen der Hände und der Unterarme. Bei der weiteren Bearbeitung werden Personen mit Unfalldeformationen der Hände ausgeschieden, sowie auch solche, die im Verlaufe der letzten 5 Jahre den Charakter ihres Berufes änderten. Alle wurden in zwei Gruppen geteilt — manuell und geistig Arbeitende. In der Gruppe der manuell Arbeitenden sind jene Arbeiter eingeschlossen, die bei der Ausübung ihres Berufes Werkzeuge benutzen. In der zweiten Gruppe sind vorwiegend Techniker, Studenten, Lehrer u. ä.

Ergebnisse

Die Werte der angeführten Ausmaße findet man in den Tabellen und Diagrammen (Abb 2, 3). Versuchen wir es nun, die Frage zu beantworten, ob sich die zwei angeführten Gruppen in irgendeinem der gemessenen Handmaße statistisch unterscheiden. Vorerst ist es notwendig festzustellen, ob die Größe der Gruppe (Personenanzahl) für eine hinreichend genaue Abschätzung ihrer statistischen Parameter hinreicht. Zu diesem Zweck haben wir Tabellen benutzt, die die Abhängigkeit der nötigen Anzahl der Elemente der Gruppe von ihrem Streuungskoeffizienten angeben.

Wenn wir eine Fehlergrenze von 5% zulassen, was sicher erlaubt ist, da die Meßfehler gleicher Ordnung sind, so beträgt im ungünstigen Falle (d. h. bei maximalem Wert des Streuungskoeffizienten, der bei unserer Zusammenstellung etwa 10% beträgt) die notwendige Anzahl der Elemente der Gruppe höchstens 33.

Das Problem der Gleichheit oder Verschiedenheit der einzelnen Maße bei den zwei angeführten Gruppen ist das Problem der statistischen Identität zweier empirischer Verteilungen. Gemäß Urbach ist im Falle einer kleinen Anzahl von

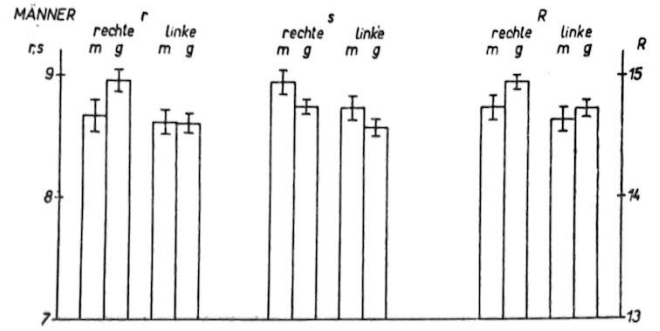


ABB. 2

Durchmesser der Ausmaße r, s und R der rechten und linken Männerhand (m - manuelle, g - geistige Arbeitende)

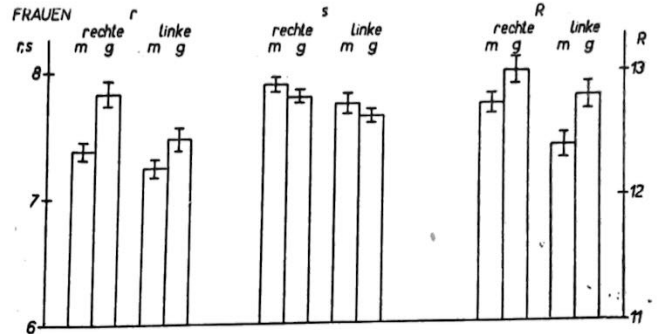


ABB. 3

Durchmesser der Ausmaße r, s und R der rechten und linken Frauenhand (m - manuelle, g - geistige Arbeitende)

Elementen der Gruppe das Kriterium von Kolmogorow-Smirnow am vorteilhaftesten. Wir haben folgenden Vorgang gewählt: Zur groben Orientierung benützten wir zuerst den t-Test; jene Fälle, bei denen wir bedeutende Unterschiede fanden, testeten wir dann nach dem Kriterium von Kolmogorow-Smirnow. Die Ergebnisse des t-Testes sind in der folgenden Tabelle angeführt:

Männer	Rechte	Linke
r	< 2	< 2
R	< 2	< 2
s	< 2	< 2

Frauen	Rechte	Linke
r	3,75	3,75
R	2,05	2,90
s	< 2	< 2

Der kritische Wert des t-Testes beträgt in unserem Falle 2,75. Das Ergebnis des Kolmogorow-Smirnowschen Testes für das Maß r bei den Frauen ist für die rechte Hand 2,11 und für die linke 2,26, wobei der kritische Wert 2,65 beträgt. Aus diesen Ergebnissen folgt, daß die gefundenen Maße bei beiden Gruppen aus der gleichen theoretischen Verteilung hervorgehen, d. h. daß sich diese Maße statistisch nicht unterscheiden.

TABELLE
MÄNNER
Manuell Arbeitende

Rechte						Linke			
	n	$X \pm 3 \cdot s_{\bar{x}}$	σ	V [%]	min—max	$X \pm 3 \cdot s_{\bar{x}}$	σ	V [%]	min—max
s	29	$8,95 \pm 3 \cdot 0,098$	0,53	5,92	8,0—9,8	$8,74 \pm 3 \cdot 0,100$	0,54	6,18	7,6—9,7
r	29	$8,67 \pm 3 \cdot 0,128$	0,69	7,96	7,4—10,4	$8,62 \pm 3 \cdot 0,098$	0,53	6,15	7,8—9,8
R	29	$14,74 \pm 3 \cdot 0,149$	0,80	5,43	13,2—15,7	$14,64 \pm 3 \cdot 0,128$	0,69	4,71	13,3—16,3

Geistig Arbeitende

s	54	$8,75 \pm 3 \cdot 0,061$	0,45	5,14	7,8—9,7	$8,58 \pm 3 \cdot 0,069$	0,51	5,94	7,5—9,4
r	54	$8,96 \pm 3 \cdot 0,092$	0,68	7,59	8,0—10,1	$8,61 \pm 3 \cdot 0,076$	0,56	6,50	7,0—9,4
R	54	$14,95 \pm 3 \cdot 0,100$	0,74	4,95	13,6—16,0	$14,73 \pm 3 \cdot 0,102$	0,75	5,09	12,8—15,8

FRAUEN
Manuell Arbeitende

Rechte						Linke			
	n	$X \pm 3 \cdot s_{\bar{x}}$	σ	V [%]	min—max	$X \pm 3 \cdot s_{\bar{x}}$	σ	V [%]	min—max
s	33	$7,91 \pm 3 \cdot 0,059$	0,34	4,30	7,1—8,6	$7,74 \pm 3 \cdot 0,080$	0,46	5,94	6,8—8,5
r	33	$7,38 \pm 3 \cdot 0,067$	0,39	5,28	6,1—8,5	$7,24 \pm 3 \cdot 0,067$	0,39	5,39	6,0—8,2
R	33	$12,74 \pm 3 \cdot 0,081$	0,47	3,69	11,1—13,9	$12,38 \pm 3 \cdot 0,097$	0,56	4,52	10,1—13,2

Geistig Arbeitende

s	66	$7,81 \pm 3 \cdot 0,053$	0,43	5,51	7,1—9,0	$7,64 \pm 3 \cdot 0,052$	0,42	5,49	7,0—8,8
r	66	$7,83 \pm 3 \cdot 0,101$	0,82	10,47	6,1—10,2	$7,67 \pm 3 \cdot 0,094$	0,76	9,91	6,0—9,9
R	66	$13,02 \pm 3 \cdot 0,109$	0,89	6,84	11,3—15,6	$12,80 \pm 3 \cdot 0,109$	0,89	6,95	11,2—14,8

n = Anzahl der Probanden
X = arithmetischer Mittelwert
 $s_{\bar{x}}$ = mittlerer Fehler

σ = Standard Deviation
V = Streuungskoeffizient
min—max = minimum — maximum

SCHLUSSFOLGERUNG

- Die Ergebnisse lassen sich, wie folgt, zusammenfassen:
1. Das Schließen der Hand ist beim Messen mit Herigs Konus natürlich und bequem; diese Form ist auch für die Griffkonstruktion geeignet.
 2. Die Werte der Maße r, R, s der Gruppe der manuell und der geistig Arbeitenden unterscheiden sich zu wenig, als daß man sagen könnte, die Unterschiede seien beweiskräftig.
 3. Auch zwischen der rechten und linken Hand innerhalb jeder Gruppe wurden keine Unterschiede gefunden.
 4. Es müssen daher weder für die rechte noch für die linke Hand der zwei angeführten Personengruppen abweichende Griffe konstruiert werden.
 5. Die gemessenen Dimensionen können für die Bestimmung der Größentypen der Griffe wichtig sein.

SUMMARY

The data by 182 probands (83 males and 99 females) were gathered and divided into two groups: for the bodily work-

ing and for the brainworking. The calculated average means demonstrated only very small differences between the both groups. They was neither statistic significantly differences between the both groups nor between right and left hand.

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ANTHROPOLOGY, MEDICINE, AND THE INTERNATIONAL BIOLOGICAL PROGRAMME

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Read at the Symposium of Anthropological and Medical Science 1968, Prague.

In the first part of my report I would like to tell you something about the views of a pioneer in anthropology, Dr. Aleš Hrdlička, on the problem of the relationship between anthropology and medicine, while in the second part I would like to draw the public's attention to the intentions and aims of the International Biological Programme, which stands in very close relationship to the problems discussed in today's symposium session.

It is characteristic that Hrdlička's first contribution to the journal newly founded by him, the "American Journal of Physical Anthropology", in 1918, published in the first number, is entitled "Anthropology and Medicine". This topic was dealt with by Hrdlička in the journal "Science", in 1928 (Vol. LXVII, No 1737). In the first mentioned report he deals with the close and direct relationship of anthropology to medicine and he shows in brief what doctors, particularly anatomists, had done for anthropology. (I would like to mention here an analogy in Czechoslovakia in the time between two World Wars). In the other report he defines anthropology in rough comparison as a daughter and continuation of medical science. He says: "The best and shortest definition of anthropology today (1928) is that it is human phylogenesis of man's past, present, and future. Taken in greater detail, this is the science about the origin and evolution of man or human phylogenesis, secondly this is a comparative science about the human life cycle from fertilization to the end of human ontogeny, and thirdly this is a science about human variation. All that simply means that it is the biology of man and a developed comparative anatomy of man, physiology, chemistry, and, up to a certain extent, also pathology."

A significant feature of anthropology, which distinguishes it from medical science, is its comparative character. It studies in the first place human groups of certain age, sex, race, social status, vocation, possible abnormality, and compares them with the others. As far as the "practical" application is concerned — Hrdlička continues to say — there is the difference in that medicine endeavours essentially to restore the damaged or ill health of man, while anthropology tries to discover and show the noxious as well as the beneficial factors of further human development. With considerable justification, anthropology could be designated as medicine of human groups.

As it is, anthropology is thus useful for medicine with the majority of its research activities (whether directly or indirectly). It is another point that medicine has not, or cannot have full advantage of anthropological knowledge, and that it is connected with its similar inability as compared to biology, physics or chemistry. This is the trouble with assimilation. It can, however, be said at once, that medicine is now using the numerous results of anthropological research activities, without being aware of their sources.

Thus for example:

Research activities in physical anthropology began on the material from the fifties of the past century. That total number of anthropological publications had reached (by 1928) many thousands.

Further, Hrdlička analyses the works according to a loose-leaf catalogue and gives the contributions in accordance with entries selected incidentally: skull, children, pelvis. Consequently he analyses the contents of the oldest anthropological journal, "Bulletin of the Anthropological Society in Paris", as well as the contents of his own journal mentioned above — the first ten volumes.

The representation of the particular topics in the "A. J. P. A." by per cent is as follows:

evolution of man	13.4 %
embryology, development of child, adolescence, old age	11.6 %
human variation, races	43.6 %
heredity, demography, abnormalities	5.5 %
comparative physiology of man	11.0 %
characteristics of U.S. population	3.5 %
reports of general character, history, methods	13.4 %

The author had made a list of all reports for the renewed journal "Anthropologie" since its foundation in 1923 until it was stopped in 1941, and he is convinced, so much the more that both journals had a common scheme of topics, that the representation of works in the division given would find a similar response.

Dr. Hrdlička further selected the titles of articles in the first three volumes of the American anthropological journal, and pointed out certain reports. Further he gives the merits of known writers whose studies are of use to medicine: Broca, Retzius (brain), Manouvrier (brain physiology), Virchow (skull deformities), Quetelet, Vierordt (body proportions), Galton, Lombroso (heredity, abnormal and defective groups), Ruffer (prehistoric pathology). He mentions also some older American authors as Morton, Bowditch, Sargent, Mall, and others, and from the then living he mentions Bean, Boas, Davenport, Hooton, Terry, Danforth, etc. Under the title "Anthropologists of the Smithsonian" he gives his reports on the Red Indians, on the weight and preservation of the brain, physical and physiological characteristics of the white Americans, about ear tumours, dental arches, etc.

The contributions of anthropology to medicine are divided by Hrdlička into the following three main parts:

1. those elucidating man's evolution both in the past and present,
2. those helping to get to know human variation,
3. those providing normal standards for medicine.

The knowledge of past and present developments containing indications for the future is necessary for medicine. Equally necessary for medicine in the future will be the knowledge of human variation, which teaches that everything, i.e., the structure of body, organs and their functions, causes of diseases and their course, undergo a significant variation, even in normal, uncomplicated conditions. Without understanding the normal variations of each individual character, each process and expression of normal and abnormal man, it is impossible to understand any branch of medicine. Here anthropology has been and continues to be a useful help to medicine. To prove this, Hrdlička deals in his article with the weight limits of children of definite age and of adults, boundaries of the pulse, of the size of the head, the pelvis, etc. The third chief service of anthropology to medicine — Hrdlička continues — is that it provides norms. In order that a doctor might properly appreciate a particular part of the body (its size or proportionality), he must observe the norms of the respective part and population at a given time. It is the very task of anthropology to work out such norms, and limits of normal variation. Hrdlička himself had provided norms for the American population in his study concerning the so-called "Old Americans".

The author concludes with an appeal for closer cooperation between anthropology and medical science by pointing to the fact that Europe and other continents (Japan) possess a greater knowledge about the use of anthropology in medi-