THE METRIC SYSTEM OF IDENTIFICATION OF CRIMINALS, AS USED IN GREAT BRITAIN AND IRELAND

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Six years have elapsed since a Committee, appointed by the Home Secretary of State to inquire into the best means available for identifying habitual criminals, presented their report, and the recommendations they made were adopted by the British Government. During this period the system then inaugurated has been steadily maturing, and the time has come when we may, with advantage, review its progress and critically examine its efficacy.

Soon after the publication of the report of the Committee, the Home Secretary did me the honour to appoint me scientific expert to organise the introduction of the new system, and my duties in connection with it have continued without interruption ever since.

As the report just mentioned formed the basis from which the system now in use was started, it is necessary to recapitulate its salient outlines, in order to complete the history of the introduction of the metric system of identification into England.

The Committee consisted of Mr. C. E. Troup, C.B., then in the Criminal Department of the Home Office, as Chairman; Major A. Griffiths, then one of H.M. Inspectors of Prisons; and Mr. M. E. Macnaghten, the Chief Constable attached to the Criminal Investigation Department of the Metropolitan Police, with Mr. H. B. Simpson of the Home Office as Secretary. While the Committee thus constituted did not include any scientific expert, it was composed of experts of high standing in the various departments of the public service which have to deal with crime and criminals.

The warrant appointing the Committee directed them to inquire (*a*) into the method of registering and identifying habitual criminals then in use in England; (*b*) into the "Anthropometric" system of classified registration and identification in use in France and other countries; (*c*) into the suggested system of identification by means of a record of finger-marks; to report whether the anthropometric system or the finger-mark system could, with advantage, be adopted into England, either in substitution for, or to supplement the then existing methods, and, if so, what arrangements should be adopted for putting them into practice, and what rules should be made under Section 8 of the Penal Servitude Act, 1891, for the photographing and measuring of prisoners.

The terms of reference were thus amply wide enough to cover the whole field, and a study of the report shows that the whole question was gone into by the Committee and considered with the greatest care and thoroughness.

It is, perhaps, necessary to state the reason why it is important that habitual criminals should be identified. In all civilised countries, it is a well-recognised principle of justice that persons who make crime their calling or profession in life, should be dealt with in a different manner from one who, for the first time, commits a criminal offence. This being so, it is not only important to know the antecedents of a prisoner about to be dealt with by law, but also that no mistake shall be made as to his identity, and, above all, that an individual who is not an habitual criminal, and innocent persons, shall not be by error identified as being one who is an habitual criminal.

The method by which identity is *proved* in the criminal courts of this country is dependent upon the personal recognition of the prisoner by police or prison officers, and, till the introduction of the metric system, it was also the basis by which identity was *discovered.* In country districts and in the smaller cities and towns, local criminals are well known to the police, and information as to new settlers is soon obtained. The case is quite different in large cities and towns where individual knowledge of the in-dwellers becomes a matter of impossibility. There are criminals also, who, after conducting operations in one district for a time, find it advantageous to themselves to transfer the field of their labours to some new place, almost invariably a large city, where they are unknown to the police, and may ply their nefarious mode of life for a while with more or less impunity.

To assist the police in identifying habitual criminals, a register was specially established by Parliament, in 1869, for general use throughout the country, in which are entered the names, description, crime, and other particulars, of every convict, and "person convicted on indictment of crimes, a previous conviction of a crime being proved against him," discharged from prison during the year, and a copy of it is supplied to all police forces and prisons throughout the country. A register of the distinctive marks on the persons of habitual criminals was also instituted and distributed with the register. The various police forces have also instituted registers of their own, printed descriptions of noted criminals, and the like, to assist their officers in recognising persons who are habitually engaged in crime. The photographs of such persons have likewise been collected for several years, and, in the Metropolitan Police Office, may be numbered by tens of thousands, if not by still higher figures. Systematic observations and inspections, by police and prison officers, have been instituted of arrested persons, with a view to the recognition of such of them as have been previously convicted, and inter-communications between police forces have been freely resorted to with the same object.

Notwithstanding the best efforts of the police and prison officers, mistakes in identification have occasionally occurred, and a considerable number of old

offenders pass through the Courts unidentified. Of the accuracy of these statements I have had good evidence during the last few years. Almost immediately after the introduction of the metric system into England, I was called to report upon the identity of a man who had been convicted of larceny and sentenced to a term of seven years' penal servitude. At his trial he had been identified as the individual who committed the larceny, with which he was charged by the shopkeeper who had been robbed, and by his assistant, and he was sworn to by prison officers as an old offender who had been in prison in England during certain periods. After conviction he stated, in a petition to the Home Secretary, that at the time of the larceny and during the periods he was said to have been in prison in England, he was undergoing a sentence of imprisonment in France. On inquiry being asked whether he had been measured before his discharge from the French prison, he replied in the affirmative, and gave the name under which he went at the time. His metric description having been taken here according to M. Bertillon's system, and a copy of the metric description of the individual he asserted himself to be having been obtained through the courtesy of M. Bertillon, a comparison of the two descriptions showed most clearly and conclusively that both referred to one and the same individual, and that consequently serious mistakes had been made by witnesses at his trial as to his identity; the conviction and sentence were accordingly quashed. Another case may be mentioned of mistaken identity occurring more recently, where a man convicted of robbery was identified as an ex-convict, but from our own metric office the true identity of the prisoner was found to be that of another convict who had been liberated on licence. The fact that a considerable number of old offenders escape identification at trial for subsequent offences is continually being demonstrated, as almost every month several cases occur, especially in the metropolis, of persons sentenced as first offenders, but who, on their metric description being sent to the Habitual Criminal Registry by prison governors dubious of their previous freedom from crime, or at the request of the police, are found very frequently to have not one but several previous convictions recorded against them, a matter of considerable importance under the First Offenders Act of 1897. The report of the Committee contains particulars of several cases of mistaken identity and failure to identify old offenders. I have, however, thought it well to mention the above incidents which have come under my own observation subsequently, and which go to prove the utility of our metric system and also its efficiency for the purpose for which it has been established.

When a criminal always gives the same name every time he is arrested, it is usually a comparatively easy task to trace his antecedents once he is on the Register of Habitual Criminals, even though he may move from place to place, but when he gives a different name on each occasion and at each place he is apprehended, the difficulty of identification under the old system from registers, descriptions, photographs and the like is very great, in consequence of the absence of any satisfactory classification of records being possible; hence it has been no

uncommon occurrence for a police force to arrest a prisoner against whom many previous convictions are recorded in the volumes of the Registers of Habitual Criminals carefully preserved on the shelves of their own office and diligently perused, without their being able to identify him from these registers. In the cases where identifications are made by the old system, success is obtained in many instances only after long and laborious search, and I cannot but think that chance enters very largely into the result when the prisoner is successfully traced; in other words it is much more by good luck than good guidance that he is recognised.

The Committee, as a result of their investigations, reported that the old system of identification, then in use, was not satisfactory, and left much to be desired on the grounds (*a*) of mistakes in identification, (*b*) failure to identify old offenders, and (*c*) the labour involved in making identifications.

They then proceeded to formulate what should be the essential features of any system suitable for purposes of identification of old offenders, and to examine the various methods which scientific study of the question has made available for this object.

The essential features required in such a system they define as "a means of classifying the records of habitual criminals, such, that as soon as the particulars of the personality of any prisoner (whether description, measurements, marks, or photograph) are received, it may be possible to ascertain readily, and with certainty, whether his case is already in the register, and, if so, who he is." Such a system the Committee believed to be unattainable by further development of the existing methods then in use, and that, if it is to be found at all, it must be found in the application of some such scientific method as those on which they were directed to report.

In proceeding to the consideration of the metric system, originated by M. Bertillon in Paris, and the proposal of Mr. Francis Galton to utilise the impressions of the fingers for purposes of identification, the Committee entered upon the scientific part of their inquiry, and I cannot refrain from taking this opportunity of expressing my high appreciation of the thoroughness with which they have mastered the details of these systems, and the principles whereon they are founded, brought before them by the various scientific witnesses examined, likewise on the soundness, from a scientific point of view, of the conclusions arrived at regarding the respective merits of each system.

The Bertillon system of identification has been so much before public notice of recent years, that I need not go into it here in detail, particularly as I shall have to describe, later on, the arrangement of records followed in England under the new system, which is, in its main features, the same as that used in France and other countries. I may, however, state briefly that it consists in recording the measurements of certain parts of the body which practically do not vary in size after adult life has been reached, the exact colour of the eyes, the shape of certain features of the face, a photograph showing the full face and profile

exact details regarding scars, tattoo and birth marks, and other particulars as to the individuality of the prisoner, and his criminal record. More recently, also, since the introduction in this country of the use of finger-prints, M. Bertillon has added the impressions of the first four digits of the right hand to his metric descriptions.

The cards bearing these records upon them are arranged on certain mathematical principles, according as the size of the parts of the body measured is small, medium or large, in what are termed "search cabinets," in a given order, without any reference to the name of the individual to whom it relates. A duplicate description of the prisoner is also classified alphabetically according to his name, but it is the first-mentioned classification which is one of the characteristic features of what is known as the "Bertillon System."

In order to find the card of any particular individual in the cabinets at any subsequent period, all that is required is to take a fresh metric description of him, and follow the same fixed line of procedure as was taken in storing the previous one. The measurements of the different parts of the body enable the very exact classification of the records requisite to be made, both in arranging them in the first instance, and in searching them subsequently for the record of any particular individual, while the other details as to the prisoner's personality place his identity or non-identity beyond question. The tripartite division of all measurements enables the search to be made with great rapidity, and the exact position in the cabinet of any previous record of the same individual to be determined with a minimum amount of labour in examining other records not relating to him.

This system, then, as far as regards measurements, is a very considerable advance towards fulfilling the requirements laid down by the Committee as essential for purposes of identification if absolutely invariable and accurate measurements could be obtained, but absolute perfection is not obtainable, all measurements being subject to some degree of error, either inherently connected with the parts measured, or from imperfection on the side of the measurer, besides which there may be error made in the classification of records. In practice, the amount of error arising from these different causes, if the system be properly worked and the measurers carefully looked after, is, as I shall be able to show, small and well within the margin required for efficiency.

The measurement of a part used in classification taken before the prisoner's discharge from prison, may be near the margin of a division, say the upper limit of the *small*, but being within the limits of that group, the record is placed in that division. Supposing the same individual be subsequently arrested and measured to ascertain if he is an old offender, and this time the measurer makes the same part slightly larger, so that now it falls within the limits of the *medium* division, search would be made in a different cabinet, or part of the cabinet, from that where the first record is situated with a negative result. In such a case, before we could say that a previous record of the prisoner is not in the collection, search

would have to be made in both the *small* and *medium* divisions. The same process would have to be gone through, with respect to all the other measurements that fall near the margins of divisions, so that a considerable number of searches may have to be made to determine the existence or non-existence of previous records. These *double searches*, as they are called, constitute the only difficulty in working this system, but fortunately, as I will show, do not greatly impair its efficiency, although they increase the labour in using it to a greater or less extent.

On the nature and variety of finger-prints, I have little to say in this Institute, where we have had on several occasions the benefit of Mr. Francis Galton's demonstrations on the subject. The Committee were much impressed with the efficacy of finger-impressions for purposes of establishing identity, as may be judged from the following sentences in their report:—"It seems impossible to insist too strongly on the absolute certainty of the criterion of identity afforded by the finger-prints. Considered merely as a test of identity, and not as a detective agency—there being no longer any question of classification—their use becomes at once extremely simple, and, in the hands of an expert, free from any danger of error. Apart altogether from their uses in tracing habitual criminals, it would be a very easy matter to use them much more extensively as a check to all identifications." By means of photographic enlargement, finger-impressions can be made so clear as to bring the power of comparing different sets with one another, and determining whether they are those of different persons or of the same person, well within the comprehension of the, intellectually, most poorly-gifted juryman. On this point the Committee state—"In tracing a criminal the finger-prints would be of much assistance. For verifying identifications they would give a test, which, in the hands of a skilled person, would be unimpeachable." With these statements I most fully concur, and desire to emphasise the fact that they do not come from the pen of the scientific expert who might in the eyes of some people be considered to be prejudiced, but from a Committee of—may I say—laymen. To call special attention to this is the more necessary, because I find that a good deal of scepticism on the point exists in the minds of many persons who have to deal with evidence of identity as afforded by this source, and to whom the words of the Committee may appeal with some force of conviction.

When we come to deal with the use of finger-prints as a system of identification of criminals, including the classification of records and searching for previous descriptions of the same persons by means of the finger-prints, we find that serious difficulties arise, which, notwithstanding the labours of Mr. Galton and Mr. Henry, and, to a smaller extent, my own endeavours in that direction, have not been overcome, and which, I have reluctantly to admit, appear to me to be of such a nature as to prevent a thoroughly satisfactory system workable on the large scale we require in criminal work, without the assistance of measurements, from ever being possible. The chief difficulties to my mind may be briefly summarised as follows. The great number of intermediate forms of patterns on

the fingers makes it almost impossible even for an expert to be sure that he will always determine them as belonging to the same class and relegate them to it on all occasions. This difficulty is greatly increased if the impressions be not very clear and distinct—a desideratum not always attainable from a variety of reasons. To get adequate data for classification by finger-prints alone, the impressions of all the fingers have to be utilised, with the result that the chance of some of the impressions being defective or of intermediate pattern, and consequently of error in classification and subsequent search, is thereby greatly increased. The inequality in size of the classes, rendering it necessary to resort at once to a more or less intricate system of sub-classification of the more commonly occurring patterns, is distinctly a great drawback to convenient working in the systems of classification, already proposed, and one which it is not easy to see can, even by further research, be got over. Another difficulty, not easy of solution, arises when there is resistance on the part of the prisoner to having his finger-impressions taken. This last may be thought to apply equally well to measurements, but, as a matter of practical experience, it is found up till now that it is easier to get the latter with sufficient accuracy to enable the prisoner to be traced, than to get the prints of all the different fingers of both hands good enough for determining the location of the previous records of the prisoner which invariably exist in such cases. Under these circumstances, it is sometimes all we can do to decipher the impressions of one or two fingers for the purpose of making certain of his identity or non-identity. Again an acute criminal—and there are many of them—who cared to take the trouble to learn a little about finger-prints, might soon find out that it is the central portion or core which is of importance for identification purposes and essential for the classification of records, and might, by the application of caustics or fire, so scar that all-important spot in several fingers without detriment to the fingers themselves as to render his identification from a subsequent set of impressions impossible. It is true such a procedure would probably only serve him once. This would be impossible with measurements as he could not tamper with his head, or do more than attempt to trick the measurer while measuring the limbs, without serious permanent damage to himself. The number of *double searches* possibly required when two or more impressions of certain of the fingers are undecipherable from any causes in the most commonly occurring patterns is very great, owing to the number of sub-classes into which these have to be broken up, and the number of combinations of these latter which may have been present in the missing or undecipherable finger impressions.

The metric description of a prisoner as taken in England includes the following particulars:—(*a*) A general description of the individual; (*b*) Certain measurements of his head and limbs together with his height; (*c*) A photograph showing views of his full face and profile; (*d*) The principal scars and marks—natural and artificial—on his body and limbs; (*e*) The impressions of all the digits of both hands. These details are in all cases taken by prison officers, in the prison where the prisoner is

METRIC FORM.

FRONT.

Prison Register No. _____.

H.C. Register No. _____

Name

Aliases

Age Year of Birth

PHOTOGRAPH.

Place of Birth

Complexion

Hair

Eyes

Occupation

*Sentenced at

„ on

„ *for

„ to

* Give offence in full, and if remanded only, substitute "Remanded" for "Sentenced."

MEASUREMENT FORMULA.

FINGER FORMULA.

MEASUREMENTS.

DISTINCTIVE MARKS, SCARS, INITIALS, ETC.

Head Length

Head Breadth

Face Breadth

Left Mid. Finger

Left Cubit

Left Foot

Height ft. in.

Remarks

I.—Left Arm and Hand.

II.—Right Arm and Hand.

III.—Face and Neck.

IV.—Chest.

V.—Back.

VI.—Rest of Body.

METRIC FORM: BACK.

Name	RIGHT FINGERS.
Prison Register No.	
Prison	
Date of Measurements	
Signature of Measurer	
Governor's Signature	

1.—Right Thumb.	2.—R. Fore Finger.	3.—R. Middle Finger.	4.—R. Ring Finger.	5.—R. Little Finger.

LEFT FINGERS.

Directions:—Before taking the impressions of the fingers, fold this Form exactly in two, and place the metal sheet between the folds.

REMARKS.

Finger Formula.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.

10.—L. Little Finger.	9.—L. Ring Finger.	8.—L. Middle Finger.	7.—L. Fore Finger.	6.—L. Thumb.

METRIC CARD: FRONT.

MEASUREMENT FORMULA.		FINGER FORMULA.	
Head Length	H. C R. No.	PHOTOGRAPH.	
Head Breadth	Prison No.		
Face Breadth	Height ft. in.		
Left Mid. Finger	Complexion		
Left Cubit	Hair		
Left Foot	Eyes		
Name			
Aliases			
Age Year of Birth			
Place of Birth			
Occupation			
Remarks		PRISON.	MEASURED BY

BACK.

DISTINCTIVE MARKS, SCARS, INITIALS, ETC.	I.—Left Arm and Hand.	II.—Right Arm and Hand.	III.—Face and Neck.	IV.—Chest.	V.—Back.	VI.—Rest of Body.	Date.	Governor's Signature.

8.—L. Middle Finger.	7.—L. Fore Finger.	6.—L. Thumb.	1.—R. Thumb.	2.—R. Fore Finger.	3.—R. Middle Finger.

undergoing his sentence, or to which he has been taken on remand, and are recorded on a form 20·4 centimetres (8 inches) square, which is here reproduced, and also on a card 20·4 centimetres long by 10·2 centimetres (4 inches) broad, which is also shown. The essential difference between the two records is that on the card the impressions of only the first three digits of each hand are shown and no particulars regarding the prisoner's offence, hence its size is only one-half that of the form, a matter of considerable importance in storage.

The general description of the prisoner calls for few remarks or explanations. The age, place of birth, and occupation depend upon the veracity of the prisoner, which is most frequently not to be relied upon. The colour of eyes and hair and the complexion are stated in general terms. In the Continental forms much stress is laid upon the colour of the iris, which under the Bertillon system is used for classification and is divided into seven classes based upon its general colour when that is uniform, and that of its periphery and of the portion bordering on the pupil called the areola when these vary. The circumstances under which the metric descriptions are taken in this country in most cases preclude the possibility of having such details recorded with sufficient accuracy to render them of value. It was therefore wisely decided by the Committee that it was not desirable to burden the records with details beyond the general colour of the iris when viewed at a distance. The want of more information on this point has never been felt. The descriptions of the various parts of the face also recorded in detail by M. Bertillon are omitted in our English form, and we trust to getting such of them as are wanted from examination of the photograph.

The measurements of the head and limbs taken are all included in the Bertillon system. They consist of the dimensions of the following parts:—(1) The length of the head measured from the notch at the upper part or root of the nose, a point corresponding to the *nasion* in the skull, to the most prominent point on the back of the head, whether that point be situated on the median line or to one or other side of it. This measurement, it will be observed, corresponds with Virchow's length measurement of the skull. (2) The breadth of the head measured at right angles to the median line of the head wherever it is greatest but not including outer surface of the mastoid processes. (3) The breadth of the face between the outer surfaces of the zygomatic arches wherever it is greatest. This measurement was not formerly taken by M. Bertillon until after we had adopted it, but I am glad that he has now realised its excellency for identification purposes, and has substituted it on the French metric cards for the width of the ear which he formerly took[1]; it is likewise included in the German and Austrian metric cards. (4) The length of the left middle finger, Digit iii of the Anatomical Series,

[1] This measurement is added as an Appendix in *Signaletic Instructions*, p. 259, an American translation, published in 1896, from the latest French edition of M. Bertillon's *Instructions Signalétiques*, published in 1893; the latter does not, however, contain any allusion to this measurement. It was adopted in our English system in 1894.

measured with the fingers bent at right angles to the metacarpal portion of the hand. (5) The length of the left cubit, taken from the posterior surface of the olecranon while that point is made prominent by bending the forearm on the upper arm at an acute angle, to the distal end of the middle finger. (6) The length of the left foot taken while the prisoner stands with the whole weight of his body resting on that foot only, and with the knee joint somewhat bent. (7) The height when standing erect.

In a general account of the system such as this is intended to be, it is unnecessary to go into further details as to how these measurements are taken.

The photograph showing exact full face and profile views of the prisoner are taken one-seventh of the natural size and according to the instructions of M. Bertillon in the section "La Photographie Judiciaire" of his work *Instructions Signalétiques*, 1893 ed.

The scars and marks on the limbs and trunk are likewise described exactly in the same manner as they are done in France, but the number of abbreviations used in describing them are not quite so numerous as those used by M. Bertillon. The particulars noted are (*a*) the nature of the scar or distinctive mark; (*b*) its form; (*c*) its size; (*d*) its direction; (*e*) its exact location. For facility of description the body is marked out into six regions, and the space assigned to each on the form and card is in proportion to the frequency with which marks occur upon them and the readiness with which they can be detected when present. I may say that in recording the marks and scars most attention is given to those which occur on the arms and hands and the face, while only the grossest deformities are noted on the lower half of the body, including the lower limbs, hence the small space assigned to the "Rest of body" (see p. 168). To secure the better and more uniform description of marks and scars, the details to be noted and the contractions to be used in so doing have been reduced to tabular form for the guidance and direction of the measurers, and will be found on the next page. The following illustrations will be sufficient to show that much time and trouble as well as space are saved by the descriptions of marks being taken in this abbreviated form:—

I. *Left Arm and Hand. Sc rc of 0·9 hz at 10 ab elb ft ua.* This written out at length reads—scar rectilinear of 9 millimetres long, horizontal at 10 centimetres above the elbow joint on the front of the upper arm.

II. *Right Arm and Hand. Sc ov of 2·2/1·3 sl a at 6 bl elb bk fa*=Scar oval of 2·2 centimetres long by 1·3 centimetres broad slanting externally at 6 centimetres below the elbow joint on the back of the forearm.

III. *Face and Neck. Nv hairy cir of 1·0 at 3· ab i pt l eb*=Nævus or hairy mole circular of 1 centimetre in diameter at 3 centimetres above the internal point of the left eyebrow.

IV. *Chest. Sc cv x of 3·5 vr at 15 bl frk & 6 to r md*=Scar curved with the hollow or concavity externally vertical in direction at 15 centimetres below fork of breastbone and 6 centimetres to right of the median.

The Finger Impressions are taken on the back of the form and card directly

Description of Marks.

No. 1. Nature and quality of mark.

sc	scar
tat	tattoo
nv	nævus, birthmark or mole
pt	point
fnt	faint, indistinct
prmt	prominent
svl	several—many
dp	deep
sml	small
smp	smallpox
amp	amputation
k	ankylosed, stiff
sw	somewhat, slightly

No. 2. Shape.

rc	rectilinear
cv	curved (add direction of cavity)
wy	wavy, up and down, undulating
jg	jagged
br	broken line
cir	circular
ov	oval
ob	oblong
sq	square
trgl	triangle
irr	irregular (not to be used for linear marks)
shp	shaped

No. 3. Size.

Stated in figures

Centimetres being the units, millimetres the decimals, thus: 1·5

Length only to be given in all line marks, length and breadth in all other marks

of should be written before the figures of size

Centimetres written thus: *1·4*

Millimetres written thus: *0·5, 0·8*

Occasionally it may be necessary to add after figures:

cm centimetre

mm millimetre

No. 4. Direction.

hz	horizontal
vr	vertical
sl	slanting
i	internal, inwards, inner, inside
e	external, outer, outside, outwards
u	upper, upwards
d	downwards
ft	frontwards or forwards, front, in front
bk	back or backwards

No. 5. Distance and relation to nearest fixed point.

at to be written before the distance

Distance to be stated in centimetres

ab	above
bl	below
bh	behind
ml	middle
r	right [or to the right]
l	left [or to the left]
&	and

(for other contractions *see* "Direction") No. 4

Localisation of Marks.

No. 6.—Position. Abbreviations for different parts of the body.

I & II.—Arm and Hand.

sh	shoulder joint
ua	upper arm
elb	elbow joint
fa	forearm
wr	wrist joint
h	hand
pm	palm of hand
j	joint
f	phalanx
T	thumb
F	forefinger
M	mid-finger
R	ring-finger
L	little finger
T-F	between thumb and forefinger
bs T	base of thumb

III.—Face and Neck.

fh	forehead
tm	temple
eb	eyebrow
rn	root of nose
nr	nostril
ch	cheek
chb	cheekbone
trg	tragus of ear
lob	lobe of ear
mh	mouth
lrx	larynx
pt	point, end (of eyebrow, chin)
gl	angle, corner (of eye, mouth, jaw)

IV.—Chest.

frk	fork of breastbone
clv	clavicle or collar-bone
md	median line of body
np	nipple
nl	navel

V.—Back.

7°	7th vertebra
md	median line of body

Names of other parts of the body must be written in full, for example:

jaw, chin, nose, &c.

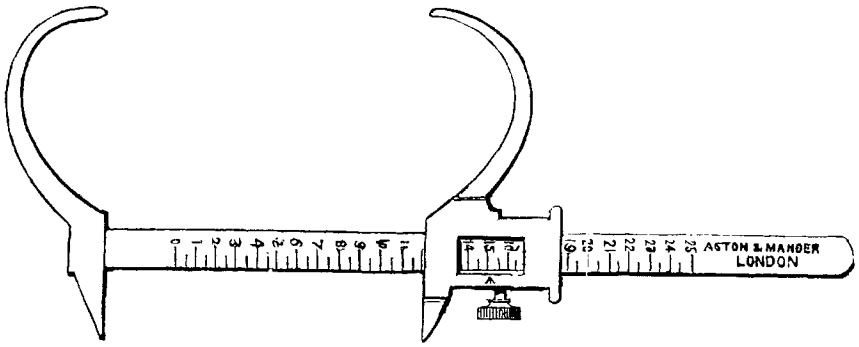
Examples.

sc scar	*rc* rectilinear	*of 0·9* of 9 millimetres	*hz* horizontal	*at 10· ab elb* at 10 cm. above elbow joint	*ft ua l* on the front of the left upper arm.
sc scar	*ov* oval	*of 2·2/1·3* of 2·2 cm. long by 1·3 cm. broad	*sl x* slanting externally	*at 6· bl elb* at 6 cm. below the elbow joint	*bk fa r* on the back of the right forearm.
sc scar	*V shp* V shaped	*of 1·2/0·8* of 1·2 cm. long by 8 millimetres broad	*vr* vertical	*on bk 2f M l* on the back of the second phalanx of the middle finger of the left hand.	
sc scar	*rc* rectilinear	*of 1·4* of 1·4 cm.	*sl i* slanting inwards	*on bk 3j F r* on the back of the 3rd joint of the forefinger of the right hand.	
nv hairy nævus, or mole hairy	*cir* circular	*of 1* of 1 cm. in diameter		*at 3· ab i pt l eb* at 3 cm. above the internal point of the left eyebrow.	
sc scar	*cv e* curved with cavity external	*of 3·5* of 3·5 cm.	*vr* vertical	*at 15· bl 7° & 6· to r md* at 15 cm. below the 7th vertebra and at 6 cm. to the right of the median.	
tat tattoo	*anchor* anchor	*of 5/4·* of 5 cm. long by 4 cm. broad.	*vr* vertical	*at 10· bl frk, & 9· to l md* at 10 cm. below fork of breastbone and at 9 cm. to the left of the median.	

from the prisoner's hands. As it is the pattern on the palmar surface of the distal section of the digit which is of importance, the impression of that portion only is recorded. This is done by spreading a thin layer of printer's ink on a smooth polished metallic plate with an ordinary printer's hand roller, and applying the fingers lightly to the plate, so that the tops of the ridges on the surface of the skin become covered with ink, while the sulci between them remain uninked. The fingers are next gently laid on the paper for a moment and then removed with the result that a series of black lines, corresponding to the tops of the ridges of the skin and clear spaces corresponding to the sulci between each of them, remain permanently recorded on the form or card. It has been found necessary to take on the form a double set of impressions of the digits of each hand, except those of the thumbs, namely, daubed prints of the outer four digits which are impressed on the upper part of each half of the form, and rolled impressions which are placed in the spaces indicated across the middle and lower edge. The reason for this is two-fold. In the daubed impressions it is often found that owing to one or more of the fingers not being quite straight or the core or centre of the pattern not being always quite medianly placed, a portion of the surface which is necessary in the decipherment of the pattern has not come in contact with the paper, and in order to get the whole impression the finger has to be rolled from side to side as is done in the second set of impressions taken. Those then are the more important for determining the finger formula. But a mistake may easily be made by repeating the impression of one finger twice, or placing the impression in the wrong space. The daubed impressions afford a ready means of detecting errors of this kind, as it is not possible to alter the sequence of the fingers when taken together in series. Moreover, by having the two sets of impressions to compare with one another, it is often possible to determine the pattern when it is defective in the one or the other set. I have set forth the reasons for taking the double set of impressions on the card because by some Continental authorities it has been said that in England we devote too much space to the finger-prints and that the rolled impressions are quite sufficient. On the card only the rolled impressions of the thumb and two following digits of each hand are recorded, because having the impressions of all the fingers doubly imprinted on the form, it is only necessary to have a few fingers to compare when making search for previous records in order to determine identity or non-identity, and so obviate having to refer to the earlier form, which has been differently disposed of in the Central Office. Such then is the metric description taken of prisoners. This part of the work is done entirely in the prisons, of which there are 60 distributed over England and Wales.

The apparatus which is required in taking the metric descriptions, exclusive of the photographic outfit, consists of two calipers or sliding compasses for measuring the head and limbs; a 30 centimetre rule for measuring marks; a plate of polished copper, a 15 cm. printer's hand roller, for taking finger-prints, a standard rule and set square for measuring the height. The special furniture for the room consists of a stool for the foot measurement, which is also used as a seat while the

head measurements are being taken, and a trestle table for resting the forearm on, while the cubit is being measured: it also serves as a table on which to place the copper plate and form while the finger impressions are being taken. The apparatus and furniture are exactly the same as those used by M. Bertillon and figured by him, except the head instrument figured below, which is of my own design, and regarding which it is desirable to say a few words in consequence of its being different from the pattern adopted in France and some other countries. It is a repetition of the instrument used for measuring the foot, cubit and finger, for brevity called the limb calipers, except that while in the latter the cross arms are straight, in the head measuring instrument they are curved. Measurements are read off exactly at the same point and in the same manner on the two instruments, each millimetre between the measuring points is indicated on the graduated scale by the actual length of one millimetre. The Bertillon head calipers on the other hand are of the compass type, with the free ends curved, and the graduations are engraved on an arc of a circle attached to one of the limbs about midway between each end. The result of this is that the distance between one millimetre and another at the measuring ends is shown on the graduated arc where the measure-



ment is read, as only about *half* a millimetre. This makes the instrument somewhat difficult to read on account of the small space which intervenes between graduation marks on the scale indicating millimetres at the free ends of the instrument. Errors in reading are therefore much more prone to occur unless the measurer be extra careful and has very good eyesight or uses a magnifying glass. By careful attention to details of construction in the manufacture, between the stem and the sliding arm of the head calipers which we have adopted in England there is as little play as in the French instrument, and the former has the great advantage of being more easily read. During the six years it has been in practical use it has given me every satisfaction, and in several tests, instituted with the object of comparing the relative merits of the two instruments when placed in the hands of the officers who do the practical work of measuring, I have found that the results have been more accurate with the former, which I think fully justify the departure I have made in not adopting the more generally used instrument. But it may be suggested that the Indian modification of M. Bertillon's head calipers, which causes it to be automatic in action, might have

been adopted with advantage. I thought so also until I had a number of them in use, when I found that the device for procuring automatic action introduced a new source of error, quite as great as that which it was invented to avoid. While with a single instrument excellent and constant results are obtained, yet when several are used for measuring the same head, one after the other, different readings are shown by the various instruments according as the index is tighter or slacker in its movement and according as there are irregularities in the arc, although the pull of the spring which draws the limbs of the calipers together may have the same strength in each instrument. No doubt irregularities on the arc could be remedied by having it cut by machinery, but the cost of this would be quite out of proportion to the number of instruments required, and the liability to errors in reading which I have previously indicated to be present in the original instrument would still remain. I was, however, so favourably impressed with the automatic idea, that I had made by way of an experiment an instrument in which the compass legs were prolonged beyond the points of measurement, and the graduated arc was placed at their extremities so as to give a reading on the arc equal in length to 1·5 millimetres for every millimetre indicated at the measuring points, and so make the instrument more sensitive. The experimental instrument was not a success, however, as it was too large and clumsy for practical use, although satisfactory as regards reading the measurement taken by it.

The competency with which the metric descriptions are taken is a crucial point in connection with the metric system of identification. Unless the measurements are well and accurately taken it is inevitable that the system must break down, however well organised it may otherwise be. The training of officers in the work is therefore most important, and has been entirely done by myself. To train a few and then let them teach others at the respective prisons to which they are attached would be to court failure, as the work requires to be done with far too much exactitude to permit of such an arrangement being successful. The plan adopted has been to form a school of instruction at one of the London prisons, and bring officers from the various metropolitan and provincial prisons to it for instruction. The classes are composed of from 14 to 18 officers selected chiefly from the rank of assistant warders as young men of intelligence and good promise in the prison service. The size of each class is fixed at the limits stated, as being the number of pupils to whose instruction experience has shown me I can give the personal attention they require to produce the best results. The course of class instruction they receive lasts for three hours per day for a fortnight, and is entirely practical with the exception of that given on two days, when the general principles of the system, the use of the instruments and the method of taking measurements, marks and finger-prints, are explained. The rest of the time they are drilled till they are conversant with the various branches of the work, after which they have each to pass a test examination on 18 cases. Anything over a difference of 1 millimetre in the head length and breadth, the face-breadth and

the finger-length, of 3 millimetres in the cubit and foot lengths, and of half an inch in the height, is counted as an error. That is to say, any deviation from the exact size of the part of more than $\pm$ ·5 mm. in the first four measurements, of $\pm$ 1·5 in the cubit and foot, and of $\pm \frac{1}{4}$ of an inch in the height are counted as errors. The maximum number of errors a candidate may have and yet pass the test is 18, on any greater number than that he is rejected as a measurer. After the officer returns to the prison to which he is attached, he has to do a certain number of metric descriptions for practice so that he may gain proficiency in his work, and when he begins to take descriptions which are to be registered for permanent record, he is set to work in conjunction with a more experienced officer than himself.

The number of male officers attached to each prison who have been qualified for the work of taking the metric descriptions and are engaged in doing it, is not less than two nor more than four according to the size of the prison. The total number of male officers required for the metric service in the prisons of England and Wales is about 150. Besides these, at the larger prisons, a certain number of female officers have been instructed in the work for taking the metric descriptions of female prisoners. They go through exactly the same course of training as the male officers, and the work they do is thoroughly satisfactory. At the smaller prisons, the measurements and finger-prints of female prisoners are taken by male officers, while the marks are taken by female officers who have gone through a course of instruction in this part of the work only. Altogether the metric staff in the prison service numbers about 200 male and female officers distributed over 60 different centres, only four of which are situated in the metropolis.

It will be obvious that unless some supervision be exercised over the work of so large a staff, spread over the whole country, their measurements would soon degenerate in accuracy, and show variations much greater than the standard, previously indicated, required for class work. Apart from actual errors some of the staff will come to take the measurements more tightly than they should be taken, while others will diverge in the opposite direction and take them too loosely. That all the staff shall continue to work accurately and with the same touch is most essential for the success of the metric system of identification. Provision for this all-important detail has therefore to be made. As taking metric descriptions is decidedly technical work requiring special knowledge, it cannot be expected of the governors of prisons to be able to supervise it at their respective prisons. It is essentially the province of the instructor or some person specially skilled in anthropometric work to do so. I have accordingly done it hitherto myself. For this purpose I have each year visited the prisons and made each member of the measuring staff take the metric descriptions of two, three, or more prisoners, independently, before me, after which I have tested their work. Defects in method or accuracy thus brought to light are pointed out and forthwith rectified. Whenever an officer is found to have any difficulties, these are explained, and if his work is bad he is stopped altogether from taking any more descriptions in future or at least until he has again become efficient by attending

TABLE I.—RESULT OF REMEASUREMENTS DURING 1897.

Measurements.	0 mm.	1 mm.	2 mm.	3 mm.	4 mm.	5 mm.	6 mm.	Total cases.
Head length	274	204	64	11	3	—	—	556
Head breadth ...	262	229	52	13	—	—	—	556
Face breadth	260	224	65	6	1	—	—	556
L. mid finger	240	220	80	16	—	—	—	556
Left cubit	208	178	119	35	7	6	3	556
Left foot	221	170	84	57	17	7	—	556

ABOVE RESULTS STATED IN PERCENTAGE.

Head length	49·3	36·7	11·5	2·0	·5	—	—	100
Head breadth	47·1	41·2	9·4	2·3	—	—	—	100
Face breadth	46·7	40·3	11·7	1·1	·2	—	—	100
L. mid finger	43·2	39·6	14·4	2·8	—	—	—	100
Left cubit	37·4	32·0	21·4	6·3	1·3	1·1	·5	100
Left foot	39·8	30·6	15·1	10·2	3·0	1·3	—	100

TABLE II.—AMOUNT OF VARIATION PER CENT.

	Nominally correct.	Error.			Total error.	Nominally correct.	Error.
		1st deg.	2nd deg.	3rd deg.			
Head length	86·0	11·5	2·0	·5	14·0	—	—
Head breadth	88·3	9·4	2·3	—	11·7	—	
Face breadth	87·0	11·7	1·1	·2	13·0	—	—
L. mid finger	82·8	14·4	2·8	—	17·2	—	—
Left cubit	97·1	1·3	1·1	·5	2·9	90·8	9·2
Left foot....	95·7	3·0	1·3	—	4·3	85·5	14·5

another class of instruction for a longer or shorter period. Besides this, a close watch is kept at the Central Office on all metric descriptions of prisoners of whom there are previous records, and the earlier measurements are compared with the later ones, to ascertain how they agree, and if the latter disagree in any particulars beyond the limits already mentioned the form is sent back to be checked and have any error, if error there be in it, rectified. The tables on p. 178 show the degree of accuracy and of error which was found in the descriptions received at the Central Office during 1897, of prisoners of whom previous metric descriptions had been registered there.

The first column of the upper half of Table I gives the exact number of cases in which each of the several measurements agreed entirely with those previously recorded of the same individual taken in almost every case by different measurers and in different prisons. The number of instances in which there was a variation of one millimetre is shown in the second column, of two millimetres in the third column and so on till the variations are exhausted. In the lower half of the same table these figures have been reduced to percentage. As the exact dimension of any part of the body measured may lie half-way between one millimetre and the next, and as no account is taken of fractions or decimals of a millimetre, that is to say, they are not recorded, it necessarily follows that the tighter or slacker measurement will be entered according to whether the higher or lower millimetre is, in the judgment of the measurer, the more nearly correct; hence a plus or minus variation of ·5 of a millimetre, equal to one millimetre, is permitted by M. Bertillon as nominally correct in the head length and breadth and in the length of the left middle finger. He has provisionally given the permissible error of the face breadth as ± one millimetre, that is equal to a variation of two millimetres. I, however, consider that this dimension can be measured quite as exactly as the other three mentioned parts, and have therefore allowed a variation of only one millimetre for it (equal to ± ·5 millimetre) as permitted in them. The results shown in the tables bear out, I think, the correctness of my contention, although I am quite aware of the fact that occasionally a case occurs in practice where the face is somewhat fleshy, or more correctly speaking fat, in which it is difficult to measure exactly and where a variation of two millimetres might be permissible without error; but these instances are quite exceptional. The cubit and foot cannot be measured so exactly as the head, hence M. Bertillon allows a permissible ± error of 1·5 millimetres giving a variation of three millimetres. I have accepted his limits of permissible error in the cubit and foot, but I think that it is rather a liberal allowance, particularly as compared to what is permitted in the other measurements. A variation of two millimetres in the former would be more in keeping with that permitted in the latter, as will be seen from the last two columns of Table II. In Table I a thick black line has been inserted to separate the nominally correct from the actual error in the several measurements, and after the two millimetres variation of the cubit and foot I have shown by a broken line where error may reasonably be considered to begin if the same

strictness is followed respecting these measurements as is done with the previous ones. But the question may also be raised on the results of this table whether a variation of one millimetre is not too strict for the head and finger measurements. If M. Bertillon's idea be correct that two millimetres variation is the nearest we can reasonably expect to arrive at in relation to the face breadth, then I think it follows that a variation for the head length and breadth and the finger length is rather too strict. On the whole, I am inclined to consider that a variation of one millimetre in the first four measurements and of two millimetres in the last two is a good standard of nominal correctness and that above these limits preventable error begins.

The higher percentage in error in the measurement of the foot revealed in this table has led me to modify somewhat the procedure M. Bertillon gives in measuring it, or rather to make a slight preliminary addition to his method of procedure. Those who are familiar with his plan will recollect that he directs the prisoner to place his foot on the measuring stool, and stand with the whole weight of the body on the left foot while the measurement is being taken, the left knee being meanwhile bent somewhat, the right limb suspended in mid-air and the body steadied by the right hand being rested on a handle attached to the trestle table. In young persons there is usually not much difficulty in balancing the body and keeping the left foot steady enough for the measurement to be taken with sufficient accuracy, but in middle-aged and elderly persons and in cases where the limbs have been affected by rheumatism or other malady it is not always possible for the prisoner to keep himself steadily balanced on one foot in the position indicated while its measurement is being taken. The preliminary procedure I have introduced is to make the prisoner place his left foot on the stool and bend the left knee till the front of it is vertically above the distal end of the great toe, the heel meanwhile resting firmly on the stool and the right foot on the floor. While in this position with the weight of the body supported by both limbs the left foot is measured and its size noted. After this has been done the left foot is then measured by the ordinary procedure of M. Bertillon, the result noted and compared with the former measurement obtained. The size of the foot should be greater when the whole weight of the body is resting upon it in M. Bertillon's method, but if the measurement first taken while the prisoner was standing with his weight supported by both feet is the greater, the measurer has a sure indication that he has not succeeded in getting the maximum length of the foot by the regular method, and that it must be taken again till he gets it properly. By the preliminary measurement he gains the important information that the length of the foot is not less than a certain figure by which he can check error in his regular measurement. Since I have introduced this procedure I have found that the number of errors made in measuring the foot by pupils while receiving class instruction has been diminished, and I trust that by its adoption as an ordinary routine in practice greater accuracy in the foot measurement is being obtained in the metric descriptions now being received.

The grosser errors shown by the tables are almost entirely due to mis-reading of the instrument, the measurement of the part having been accurately taken or with only a minor degree of error. This is clearly due to carelessness, and may I hope become less as the officers gain greater experience in the work.

The nett result shown by the tables is that the error in taking the six measurements amounts to 10·6 per cent. This is, on the whole, I consider, very satisfactory, seeing that in several prisons the officers had not had much experience in the work, and that most of the previous measurements with which the later ones were compared were taken by officers who were first instructed in the system and were generally older men than those who are now employed on the work. My experience as an instructor has been that the instruments are much more efficiently handled by younger men than by the older officers, there are, of course, a few exceptions in favour of the latter to this general rule. In younger men the joints of the arms and hands are much more supple, and dexterity in the use of the instruments comes much more easily than when the work is taken up for the first time during middle life. This is especially noticeable when drilling men in the method of measuring the head length, which is to the inexperienced perhaps the most difficult of all the measurements to take correctly, in consequence o the point of one arm of the calipers having to be held steadily against the root of the nose while the other limb is being moved up and down on the back of the head searching for its most prominent part.

The prisoners whose metric descriptions are taken in prison before their discharge for registration at the Central Metric Office are (*a*) those who have been sentenced to penal servitude; (*b*) those who have been sentenced to a term of imprisonment to be followed by a term of police supervision after their release; and (*c*) those who have been sentenced to a term of imprisonment after conviction on indictment of crime, previous conviction of crime having been proved against them at the trial. In other words those persons who come under (*a*) the 5th; (*b*) the 8th; and (*c*) the 7th sections of the Prevention of Crimes Act. Besides those whose descriptions are registered as a matter of course, the registrar may register the metric description of any other convicted criminal prisoner who, to the best of his judgment, has probably embarked on a life of crime, and regarding whom information may probably be wanted subsequently by the police.

We have now to consider how the metric descriptions of the above prisoners are disposed after they have been received at the Central Office. To accumulate records of any kind is of little use unless they be so arranged as make it possible to refer to any one individual record whenever it is wanted. This is the great merit of the system with which the name of Bertillon is so honourably connected, and which places it before all other systems in that respect. Once the record sought for has been found, identity can be proved or disproved perhaps with greater certainty by other means than by the measurements.

The metric form has a serial number for each year impressed upon it, and is stored according to that number in an ordinary drawer, a card index, arranged

alphabetically according to prisoner's names, whereon is inscribed their register number, is also made for easy reference and kept till the end of each year, when a name index is compiled from it and printed of all persons registered during the year. Thus if a person when subsequently arrested gives the same name his metric form can at once be found by the card index, or if the year he was discharged from prison and his register number is known one can go directly to the metric form.

The metric card, after having the same serial number impressed upon it as the form and any other papers relating to the same individual, is disposed of differently. It is placed in a Search Cabinet according to a specific classification by the measurements of the individual and can only be found by the measurements on the form or measurements of the same person taken subsequently.

	SMALL.			MEDIUM.			LARGE.		
	SMALL.	MEDIUM.	LARGE.	SMALL.	MEDIUM.	LARGE.	SMALL.	MEDIUM.	LARGE.
LARGE.	1	2	3	4	5	6	7	8	9
	10	11	12	13	14	15	16	17	18
	19	20	21	22	23	24	25	26	27
MEDIUM.	28	29	30	31	32	33	34	35	36
	37	38	39	40	41	42	43	44	45
	46	47	48	49	50	51	52	53	54
SMALL.	55	56	57	58	59	60	61	62	63
	64	65	66	67	68	69	70	71	72
	73	74	75	76	77	78	79	80	81

LARGE. MEDIUM. SMALL. LARGE. MEDIUM. SMALL. LARGE. MEDIUM. SMALL.

The construction of the Search Cabinet is as follows:—By two vertical partitions of thicker material than those which separate the individual drawers, it is divided into three main divisions each containing twenty-seven drawers; each of these main divisions is again sub-divided by two horizontal partitions of the same thickness as the vertical ones into three sub-divisions consisting of nine drawers in each. Again each of these three sub-divisions is further sub-divided first vertically and then horizontally on the same plan by thinner partitions into sets of three drawers. The cabinet is thus divided into eighty-one drawers. A final sub-division is made by inserting two partitions in each drawer and so dividing it into three compartments. There are thus five grades of divisions of the cabinet; each grade

bears a certain relation to each of the first five measurements on the metric card. Just as a tripartite system of division exists in the cabinet, so a tripartite division of each of these measurements is followed according as it is large, medium, or small. First then all cards in which the head length is small are assigned to one or other of the twenty-seven drawers of the left third of the cabinet, those in which the head length is large are disposed of in the twenty-seven drawers in the right third, while those of medium head length go into the middle third. The limits which determine under which of the categories a card falls, are fixed so as to give to each third of the cabinet an approximately equal number of cards namely, one-third of the total number it contains. Having determined to which of the three main divisions of the cabinet a card is to be assigned by the head length, we next take the head breadth. If this measurement be small the card will be placed in one of the lowest sets of nine drawers, if large it goes into one of the top sets of nine drawers, and if medium in one of the nine drawers of the middle three sets. The limits of *small, medium*, and *large* as regards the head breadth, are not the same for each of the three main divisions of the cabinet but are fixed in relation to the head length. That is to say, the short heads are divided up into three equal groups of *small, medium*, and *large* as regards their breadth, quite irrespectively of the breadth of head in the other two divisions. The same procedure is followed with each of the other two groups in turn.

Dealing now with each set of nine drawers. The face breadth is brought into use to determine to which vertical row of three drawers the card belongs. The row to the left contains the cards of small face breadth, that to the right those of large face breadth, while those of medium face breadth are in the middle three drawers. The limits of the three divisions of face breadth in each set of nine drawers are fixed on the same principle as before, according to the head breadth and have to be determined for each of the sets of nine drawers independently. By the length of the left middle finger which is classified into *small, medium*, and *large* for each division of face breadth, the drawer into which the card is placed is arrived at. If the finger be short the card goes into the lowest drawer of the vertical row of three drawers, if of medium length into the middle, and if long into the top drawer. Finally, the cubit lengths indicated on the cards assigned to each drawer being divided into three degrees of sizes, *short, medium*, and *large*, determines what cards are to be placed respectively in the front, middle or back sub-division of the drawer.

According to this plan of construction of the cabinet each measurement employed in classification gives three-fold powers of classifying records, and the range of variation of each portion of the body measured is divided with great exactitude into three degrees of size in relation to the size of the previous part, beginning with the head length. That measurement, which is the first, gives 3 classes, the second measurement breaks each of these in 3, giving 9 classes, the third measurement divides these 9 classes into 27, the fourth measurement divides the 27 classes into 81, the fifth measurement splits these 81 classes into

243, and so it goes on, each additional measurement taken multiplying the classification three times. By means of this system any number of records could in theory be divided up till the ultimate sub-division contains only such a number of cards as can be easily and quickly handled. In practice, however, there is only a certain limit to which this sub-division by using more measurements can be carried with advantage, in consequence of the variations which are liable to occur in measuring the parts used in classification when the same individual is measured at different times even though the work be done by the same measurer, and still more is this the case when different measurers are engaged on it, with the result that "double searches," already referred to at a previous part of this paper, become more frequently needed to find any particular record from another similar one.

The method by which the limits of the various groups are determined has now to be considered, but before doing so it is desirable to point out some of the anthropological factors which produce the range of variation met with in the parts of the body measured for the purpose of obtaining the classification just explained. The absence of absolute similarity in morphological development, which occurs in all races of men, as in all animals, and is so important a factor in evolution, gives a certain range of variation in actual size to every part of the body, even in what are termed "pure races," that is to say, in communities which have for sufficiently long periods been isolated from their fellow-men to have acquired, in consequence, more or less similar morphological characteristics. The range of variation in such a community may be less marked than in people who have not been so isolated. In these so-called pure races, also, there is a greater tendency for one part of the body to bear a more or less constant relation to another; thus we find the cephalic index, which expresses the percentage relation that the breadth of the head bears to the length, varies comparatively little in such races. In mixed communities, the range of variation of parts is considerable, and the co-relation of one part to another though increased is but slight. The inhabitants of a country may be "mixed" in different ways. They will show mixed characters as a whole, if two or more so-called pure races, or races possessing definite characteristics of their own, are settled in different parts of the country, and the metric descriptions of a certain number of each race be collected and amalgamated, or if the different races have been blended together by crossing with one another through several generations. In this latter case the mixture would show itself not only by the different parts of the body acquiring a mean form or size between the two ethnical extremes crossed, but also by the reappearance of the peculiarities of each race in different parts of the body, often of the same individual. To pass from abstract statements like the preceding to the concrete by giving a practical illustration. Let us suppose that different parts of England were occupied by two races (although in fact it contains more than that number), and that one of these is characterised by being tall and having round heads, while the other race is short in stature with markedly oval or oblong heads, which for convenience we may term long heads on

account of the long narrow appearance they present. Metric statistics of each race sorted out separately would show more or less uniformity of character, but at the same time a degree of variation ranging above and below a certain centre which would be different for each of the races. On amalgamating these statistics there would be found to be a considerably greater range of variation in the actual measurements of stature and of head length and breadth than obtained in any one of the races taken separately, and indications of a mixed population would present themselves. Another form of mixture would be obtained if for centuries these two once more or less pure races had intermarried. Their descendants would show that in some cases the characteristics of each of the ancient races were maintained, in others that short stature was associated with a long head and short stature with a round head; an intermediate form of head, a mean between the round and the long, and middle-sized stature would also occur. In the same family even there might be found one member short, medium or tall with a head intermediate in form between the round and the long, another member tall with a long head, while a third was short and round-headed. This is precisely what has occurred in England, and we have at the present day all the combinations mentioned. In some parts of the country the long-headed short race are predominant, in other parts the tall round-headed race are more numerous, and in every part of the country there are modifications of the two races assuming the form of a compromise or of the old race characters of one race appearing in one part of the body, while other parts of the body of the same individual give evidences of characters derived from the other ancestral race. There have been also several subsequent introductions of other mixed ethnic stocks such as Saxon, Norse, Normans, French, Italians, Jews, Russians, and Teutons from various parts of the Continent. In the division of each measurement used in metric identification, a true balance must be struck between the various race elements in different parts of the country, the modifications caused by the admixture of these races in various proportions, and the frequency with which one or other of the special characteristics of each of the two early races reappear. The problem is a difficult one, and the balance might be upset at any moment and require readjustment by a marked increase of criminals from one or other part of the country, or by an increase of criminals possessing the characteristics special to one or other race, or of the resultant modification produced by admixture of races. The effects of town life and of certain kinds of employment in producing degeneracy are also elements of importance which must not be overlooked as causes liable to affect the balance. The divisions which have been arrived at are as far as possible the resultant of the various factors obtained from statistics received from all parts of the country, including large towns as well as rural districts.

From what has been just stated it will be evident that it was impossible to utilise the labours of other workers in the field of metric identification by adopting their schemes of classification and applying them to our records. For example, it was useless to attempt working with the various limits which have

been found applicable to the metric descriptions of criminals in France, the ethnological composition of the inhabitants of that country being different from that of England in the proportions of the admixtures which have taken place through past ages. Nor do I think it likely that the various limits which have been assigned to the sub-divisions in England would in all respects hold good in the case of a metric bureau being established either in Scotland or Ireland, or even for the north or the south of England itself.

I have already stated that in a mixed population such as we have to deal with in England the correlation between the different measurements used for the classification of criminal records is slight. Still it is present to some extent, and has to be provided for in fixing the limits of the different groups so as to obtain equal distribution of the records in the various divisions and sub-divisions of the cabinet, which is a matter of considerable importance. By correlation between the different measurements I mean the tendency for a person of large size to have the various parts of his body large and conversely for a small man to be of small dimensions throughout his organism. This does not hold good universally, as it is well known that a man of small size may have a large head or he may be small in one of his head measurements and large in another. Inherited racial characteristics in some respects modify this tendency to correlation in a mixed mass of metrical statistics, and so assist in reducing it to the proportions in which it exists.

When we take a sufficiently large number of measurements of any part of the body whether it be of stature, head length or any other dimension, and plot the individual measurements out on paper ruled horizontally and vertically so as to form small squares each one millimetre in diameter, we find that they form an outline diagram in the shape of a curve or polygon more or less peaked to which the name of *Frequency curve* is applied, and which may be dealt with by mathematical theory. The most frequently occurring size will form the highest point or apex of the curve, and from this the outline will more or less rapidly or slowly recede till the maximum degree of divergence on either side of the mean is reached, according as the range of variation in the dimension under examination is small or great.

If the individual elements used in the formation of this frequency curve be homogeneous the curve will appear to be simple and regular in outline, and it would be a matter of no great difficulty to so divide the sum of the elements entering into its formation at each millimetre of its extent into what, for purposes of our classification, would be three equal groups, or at least near enough to be considered equal groups. The fact that the frequency curve is not always homogeneous has been noted by Bertillon and others and mathematical methods of analysing it given by Professor Karl Pearson, where two elements occur in its composition. In a mixed population such as I have shown we have to deal with in England, and in which there are various kinds of mixtures and other influencing factors, the frequency curve of any measurement often shows its composite character by irregularities of outline; especially is this the case when the metrical statistics of

which it is composed are not very numerous. The predominance or the reverse of any one or other of the various ethnical factors previously mentioned at the time the data are being dealt with, and at other times, introduces an element of uncertainty which must be provided for as far as possible, so as to prevent the necessity of having always to be modifying and altering the limits of the various groups. The probable error has therefore to be calculated and irregularities in the curves allowed for. I need not here go into the details of the various mathematical proceedings by which the several factors involved may be dealt with to obtain the desired result. I may, however, remark that an attempt was made, in the first instance, to fix the limits of the divisions directly without applying any of these mathematical processes, beyond that of sorting out the records into three equal groups, and then proceeding to deal with the divisions so arrived at by the next measurements and so on; but it proved a failure, and more scientific though more intricate means had to be resorted to which have given much more satisfactory results. The first of these tried was that of working upon the lines applied by Mr. Francis Galton to his laboratory statistics, which, at various times, he has brought before this Institute for determining the mean between different percentiles, probable errors and the like. I found as regards the first, that it was not quite exact enough for the purposes of these divisions, as by the formula he uses, viz., $\frac{1}{2}(Q_3-Q_1)+Q_1=M$ or Q_2, it is assumed that from the two first mentioned quartiles, the value of any one or both of which may be subject to a plus or minus variation, better data for fixing Q_2 are obtained than from the observed Q_2. More satisfactory results were obtained by the use of Professor Edgeworth's modification of this formula, whereby the influence of all three quartiles are called into action in determining the mean value of Q_2. This may be shortly stated by the formula, $\frac{2Q_2 - Q_1 + Q_3}{3{\cdot}2}$, or $\frac{Q_1 + Q_3 - 2Q_2}{3{\cdot}2}$, as the one or other factor is the larger. I am, however, indebted to the various publications of Professor Karl Pearson for much valuable assistance in this work. The practical outcome has been that for the purposes of primary classification, I have now got limits which I think are fairly reliable, determined for the first four measurements on the metric form and card, and those of the fifth measurement—the cubit—provisionally arranged. Progress has also been made towards secondary classification, as I have also got certain sub-divisions by some of the finger impressions in process of being worked out; as, however, these latter are still in the experimental stage I do not, as I stated at an earlier period, intend to discuss them on this occasion, but will content myself with mentioning that they are intended to take the place of the secondary measurements, colour of eyes, etc., used by M. Bertillon as a subsidiary means of classification of the French metric records.

The description of the arrangement of the metric records in the metric cabinet just given applies only to those of males who have reached adult size. The metric descriptions of women are separately dealt with. Being comparatively few in number as compared to the records of males, one cabinet with twenty-seven

drawers has been ample for their accommodation. The same plan of sub-division has been adopted for this cabinet as for that of the males, but fewer measurements have been requisitioned for the purpose of primary classification, and different limits fixed for the several classes.

The metric descriptions of growing youths up to twenty years of age are dealt with separately from the records of adults, and for the classification of the former finger impressions only have been employed as recommended by the Committee in their report, it being obvious that earlier records would in many instances be missed if search for them were made from metric descriptions taken a year or even less subsequently, in consequence of the growth during the interval of the parts measured.

The system of recording the metric descriptions of prisoners used in England differs from that of the French system, which has been adopted by the continental nations of Europe, chiefly in particulars of secondary importance. If a metric description be sent to the Central Office here from France, Germany, Austria, or any of the other countries which has adopted the metric system of identification for its criminals, search can be made for the prisoner by it, because all the information required for search by our system is contained on such foreign metric card. If on the other hand the metric description of any person arrested or in prison in England is applied for by a continental nation or we desire to have search made for him in some continental metric bureau, I am able to get the various additional particulars and measurements taken in our prisons which are required by the Identification Bureau so applying or applied to for information to enable search to be made for the prisoner by the Bertillon system.

Hitherto I have dealt with the processes of recording and classifying metric descriptions so as to form a register which will enable us to lay our hands upon any particular record contained therein with the minimum amount of labour and in the shortest possible time. We have now to consider how this metric register is to be used in order to realise the main object for which it has been established, namely, the identification of criminals. In doing so I have first to describe what steps have to be taken by Police Forces throughout the country, desirous of obtaining information as to the criminal history of anyone it may contain, and secondly, what has to be done by the staff of the Metric Office when a request for information regarding any person thought likely to be registered in the Central Office, is received.

When a person is arrested on a charge of having committed an offence and he is unknown to the police by whom he is arrested, it is usual to ask the magistrate before whom he is brought in the first instance to remand him to enable inquiries to be made regarding him, or the magistrate may of his own initiative remand the prisoner for that purpose. If the magistrate grants the application for a remand or himself remands the prisoner, the following blank form, which has been approved of for the purpose by the Home Secretary, is filled up by the police in charge of the case, asking for the metric description of the prisoner to be taken

by the governor of the prison in which he is kept during the time for which he is remanded.

The Chief Constable of _____
hereby makes application that the measurements, description, finger impressions and photograph of _____

_____

charged at _____
with _____
and remanded till _____
shall be taken and forwarded to the Registrar of Habitual Criminals, New Scotland Yard, London, for the purpose of obtaining information as to h... antecedents, as in consequence of the nature of the offence with which ...he is charged, there are grounds for suspecting that ...he has been previously convicted, or has been engaged in crime.
* _____

_____

Approved.

_____ *J.P.*

Signed _____

Rank _____

day of _____ 189

To The Governor,
H.M. Prison ...

N.B.—The Officer of Police signing this application must be of not lower rank than Superintendent.

* Other reasons, if any, to be here stated.

This form is submitted to the magistrate or to a Justice of the Peace for his approval. If he approves of the metric description of the prisoner being taken, he signs the form, and it is forwarded with the commitment warrant and the prisoner, or subsequently, to the Governor of the prison. In the metropolis the approval of the Commissioner of Police or of an Assistant Commissioner is sufficient, they being *ex officio* Justices of the Peace. With the delivery to the prison officials of the form bearing the magistrate's approval the duty of the police ends, till a reply has been received from the Metric Office. The Governor of the prison has forthwith, on the receipt of the prisoner and the application, to have the metric description and photograph of the prisoner taken and forwarded to the Metric Office for search. This may seem a somewhat long and roundabout procedure, but were the various circumstances which led to its adoption taken into account, I think it would be regarded in a more favourable light than it appears in at first sight. The question may naturally be asked, Why do not the police take the measurements of a prisoner on his arrest? The Governor of a prison is the only one who is authorised by Act of Parliament to measure and photograph a prisoner. To extend the power to the Police Forces we would have had to wait for an Act empowering them to do so, to be passed before the system could have been introduced. Again, supposing such an Act to have been passed, there are

in England and Wales no less than about 200 Police Forces independent of each other, for each of which, at least, two measuring officers would have had to be trained, and in several forces four to six officers would be required, so that the total staff to be trained and looked after would have amounted to from 500 to 600, a number which it would almost be impossible to keep efficient at the work.

On receipt of the application and metric description at the Metric Office the pattern of the finger impressions have to be deciphered and noted on the metric form in the space assigned on it for the finger formula, likewise the measurement formula is made out and noted on it from a key to the cabinet, containing the limits of the different divisions and sub-divisions. By this means the exact drawer, and sub-division of the drawer is arrived at where any previous record of the prisoner should be, if there be a previous record of him. The searcher is thus able to go directly to the exact series of records, and turn over the few cards it contains till he finds the previous description of the prisoner. The time occupied in noting the measurement and finger formulæ, and searching for the previous record in ordinary cases occupies from three to five minutes. If no previous record be found of the prisoner in the set of cards indicated by the measurement and finger formulæ, the searcher has to see whether any of the measurements are close to one or other margin of the tripartite division of any measurement, and if so, repeat the search in the other division or divisions in which it might be before he can say that no previous record of the prisoner exists in the cabinet, because on a previous occasion when the prisoner may have been measured, the measurer may have made the measurement of the part near the margin of the division tighter or slacker, as previously mentioned. The result of the search, whether it be positive or negative, is then forthwith communicated to the police force applying for the information regarding the prisoner, and if a previous record be found, the list of previous convictions recorded against him are forwarded with the answer. Unless the measurements be bad, which they seldom are to the extent of making the search ineffectual, it so rarely happens for a prisoner to be missed on careful search being made, that it may be accepted when a previous record of him is not found, that he has not been liberated from prison on the expiration of a sentence of imprisonment for serious crime during the time the metric system of identification has been in force, which of itself is strong evidence in favour of his not being an habitual criminal.

The number of searches which have to be made before a prisoner is found is important in determining the usefulness of the system, the weak point of which, as I have previously mentioned, is the occurrence of marginal measurements requiring searches to be made in more than one division of the cabinet. Naturally, when a previous record is not found where the metric form indicates it should be, the searcher, desirous of making sure that there is really no previous record of the prisoner in the cabinet and so prevent his being "scored off," on it being subsequently discovered that such a record did exist and had been missed by him, is led to allow freely for possible errors of measurement.

It is therefore desirable to ascertain how far such multiple searches may be pushed with advantage and with what prospect of success.

The following table compiled from the number of searches made in cases where previous records were found and the prisoners identified as old offenders may be useful, though the percentages therein given are only put forward tentatively in consequence of being based upon too few data to be entirely reliable, but may be considered as it were the "first fruits" of the metric system in England.

Identifications made on—

1 search	61·0	per cent.
2 searches...	17·1	„ „
3 „	11·0	„ „
4 „	2·7	„ „
5 „	3·6	„ „
6 „ and upwards	4·6	„ „

From the above table it will be seen that to find the previous records of about 90 per cent. of the prisoners already registered, not more than three searches were required, and of that percentage two-thirds were found on the first search; after the fifth search the number found rapidly decreases. No doubt by making so many searches the bad effects of errors in measurement have been counteracted, but as time goes on and the measuring staff becomes more expert at the work I hope better results may be looked for.

The first two-and-a-half years after the metric system was introduced were occupied in training a staff of measurers for the various prisons, and in recording metric descriptions of prisoners before their discharge from prison. It was not until about 6,000 descriptions had been classified in the metric cabinet that the actual work of making identifications by means of the system was begun and then but gradually. I have therefore only the results of three years to show and compare with those obtained under the old system. Starting with only a small proportion of records as compared to the number of criminals, and of criminal records on which the Metropolitan Police had to draw for their identifications, and there being still not more than 18,000 metric descriptions classified in the cabinets, it will be obvious that the best numerical results obtainable by the metric system have not nearly been reached yet. The percentage of identifications by this system has, however, shown a steady increase from the beginning, and I feel sure that as the descriptions of the criminal population are obtained and classified, this increase will continue in the number of identifications effected by means of it. The results obtained during the last three years from the beginning of June, 1897, to the end of May, 1900, show that of the total number of applications received at the Metric Office requesting information as to the antecedents of prisoners and accompanied by metric descriptions, exactly 30 per cent. were identified as former offenders. In many cases I have reason to know that the metric system was only resorted to after other means of discovering the

identity of these persons (numbering in all over 2,000) had failed. The mere number of identifications made by the metric system is but a single factor in estimating its value, and the large amount of time that has been saved to the Police Forces who have used it is equally important. The officers who would have been detailed to make investigations under the old system have been employed at other work, and the identifications have been made with a certainty and accuracy which under the old system were wanting, and most probably in many instances where no connection with previous convictions would have been traced.

Turning to the Report of the Committee for 1894 once more, I find a valuable table of statistics of the search forms received and the identifications made from the records at the Headquarters of the Metropolitan Police during the years 1891, 1892 and 1893, under the old system of identification. By adding together the searches received from the various Divisions of that Police Force and the route-inquiry forms received by it from Provincial Police Forces during these years, we have a total number of 23,110 searches; adding the identifications made from records during the same years, we find they amount to 3,922, which gives a percentage of almost 17·0 identifications from the previously mentioned number of searches.

Comparing the results of the searches made by the metric system with the above made under the old system together, we have the following result:—

Identifications by metric system	30·0 per cent.
„ from records by the old system	17·0 „ „
Increase of identifications by metric system ...	13·0 „ „

As regards the time taken in searching by the old system, I find a significant note under the table referred to which is as follows:—"On the 1st day of March, 1893, 21 officers attended to search for 27 prisoners, taking in all 57½ hours to search; resulting in 7 identifications." Giving a liberal allowance of time for searching by the metric system the same work could be done by one officer in four hours.

The benefit to be derived from the use of the metric system to Police Forces in aiding them in their work of identifying criminals has not yet been fully realised except by a few Forces. As it becomes better known I have no doubt it will become much more extensively employed than hitherto, and the reliability which can be placed on the identifications made by means of it will be appreciated not only by the Police Forces of the country, but also by those who have to administer the law, in the persons of magistrates and the judges of the higher courts. The state of organisation of the system is such as to enable any increased demands which may be made upon it to be met with ease. Sufficient proof of its utility has already been forthcoming to show that it has passed successfully through the experimental stage, and that it is capable of fulfilling all that may be required of it in future, provided that it is carried on with due regard to the scientific bases on which it depends for its

existence. But it is necessary to emphasise this proviso. The metric system of identification is not like a machine such as a steam engine or a watch which will work satisfactorily on being supplied with the motive force it requires under the hands of those not skilled in its construction. In other words it cannot be carried on successfully as an ordinary branch of a government or police office. To be successful it must ever be considered and treated as a scientific laboratory to be carried on under the immediate supervision and personal direction of a scientific expert at the work, one who has a good knowledge of human morphology and also of mathematics as applied to statistics, and medical jurisprudence. There is no finality in the arrangements of any part of the system; modifications and improvements must ever take place if it is to progress and keep up with the calls upon it. I have heard the complaint made that M. Bertillon was ever making changes and alterations in the arrangements of the Paris Anthropometrical Bureau. This instead of being a ground of complaint is a sign that the system there is being maintained in an efficient condition. In this country the need of expert direction is still more necessary than in Paris, seeing that here none of the work of measuring prisoners is done at the Central Office whereas in Paris a great part of it is done under M. Bertillon's own eye. Here the work of the measuring staff at the Prisons and of the searching staff at the Central Office though entirely separate has to be kept in harmonious touch the one with the other. The disregard of scientific direction has proved disastrous to the success of the metric system of identification in some countries where it has been started and carried on for a time by police officers who have had only a little instruction in it, and cannot be expected to be proficient in the sciences on which it is based. I have been constrained to dwell upon these points because of the apparent simplicity and ease with which the practical results of the system seem to be obtained to those who are not versed in the underlying principles and work upon which the practical results depend, and which if not attended to must inevitably cause it to break down. I have no hesitation in stating that unless adequate provision is made for carrying it on in the way which is essential to its very existence, it is far better not to attempt identification by this system. Inquirers have sometimes said to me, "We do not want the scientific part of the system, only show us how it is to be worked in practice." My reply is, "You may as well try to play *Hamlet* without anyone to take the part of Prince of Denmark, as to attempt to do without the scientific part of the system." But I do not wish it to be inferred from anything I have just said that there are inherent difficulties in administering this system. All I mean to state is that adequate knowledge of and training in the sciences on which it is founded are essential to carry out the system satisfactorily. No one would think of entrusting the medical or surgical treatment of the patients in a hospital to the civil governor and his clerks, however capable he might be in his own sphere. By a person possessing the necessary knowledge the metric system of identification can be as easily directed, and the various contingencies which occur provided for, as the work

of a physiological laboratory can be directed by a physiologist, or as a chemist can direct his laboratory. The metric laboratory has the advantage that it only requires the head of it to possess scientific knowledge, the actual work of it can be well carried out by prison and police officers, after a certain amount of training, under his direction.

If in the future the metric system be conducted in this country on the lines I have indicated, which are those on which it was started, I have no hesitation in predicting that its progress in the future will be thoroughly satisfactory, and that it will realise the utmost expectations of the Committee which recommended its adoption.

DISCUSSION.

Mr. D. MACIVER said:—Dr. Garson, in his capacity as scientific expert at Scotland Yard, is trying by means of anthropometry to discover the differences which characterise individuals, but when he writes the instructions in *Notes and Queries on Anthropology* he is describing measurements which aim at eliminating individual variations and obtaining the characteristics of race. Obviously, therefore, it might be expected that different points of measurement would be selected for the attainment of diametrically different ends. But to our surprise we find that it is precisely the measurements employed by the ethnologist, *e.g.*, head-length, head-breadth, face-breadth, which figure in the forefront of Dr. Garson's list of prison measurements. There is therefore a dilemma. The measurements referred to must either show racial characteristics and be of use to the ethnologist, or they must show individual peculiarities and therefore be of value to the prison expert. They certainly cannot do both at once.

Colonel GARSIA said:—The system of identification explained by Dr. Garson has recommended itself to me by reason of its being based on something approaching to certainty, for in my long experience in connection with criminals I have realised the uncertainty of the former system, which was based entirely on recollection by a prison officer or policeman of the features of a criminal. How unreliable was that system of identification may be gathered when I mention how on one occasion I complimented an old and trusted prison officer on his memory, which enabled him, as sessions officer, to identify as old criminals persons he had not seen for a great number of years, to which he replied, "Sir, I swears to what the police tells me; they knows best." I was completely converted to the system of identification by measurements when, as Dr. Garson has mentioned, the release of an innocent person, shortly after the system was introduced in England, was brought about by it. That was the case of a prisoner in Reading Prison who had been tried and convicted of a fraud said to have been committed by him some months before his arrest. The accused had been duly identified as the thief and an old criminal. He petitioned, after being sentenced, declaring that he was not the thief, and that it was mistaken identity, as he was in prison in France when the fraud was committed. The measurements and other particulars of the person he represented himself to be were then applied for and obtained from Monsieur Bertillon in Paris, and they proved to be identical in every particular with the prisoner's measurements taken at Reading, and the truth of the prisoner's statement being so fully

established, he was released. Not being a scientist, I do not attempt to criticise the science of the system of measurement and finger-prints so ably explained by Dr. Garson. I can only say, I so thoroughly believe in the system that I have recommended the Secretary of State for War to adopt it for preventing fraudulent enlistment in the army, and for checking desertion. I have recommended that every person discharged from the army for any cause, except on termination of engagement, and every returned deserter, shall be so measured, and a register similar to the criminal register be kept, and on a doubtful person offering to enlist he shall be measured and his measurement be checked before he is attested. I believe such a system would be a much more effective way of stopping desertion and fraudulent enlistment than imprisonment. The system is still, I think, in its infancy; but it seems to me far better than that in use in France and other countries, seeing that it is a combination of the methods of Monsieur Bertillon and Mr. Francis Galton, and I feel that we are much indebted to Dr. Garson for the instructive and interesting address he has given us.

Major E. G. CLAYTON said he could only endorse all that Colonel Garsia had said concerning the advantages the present system of identification possesses over the old system; these advantages he considered to be undeniable.

Mr. GALTON said he had not experienced the difficulty that Dr. Garson mentioned in the consistent classification of intermediate forms of finger-print patterns. There were not many of them, and a small standard collection sufficed for reference. The essential point was that the doubtful cases should be decided at first with scrupulous care, and in strict accordance with the standards; then, after a short time, a right decision would be rapidly formed. Neither could he think that much difficulty need arise from a refractory prisoner. It did not seem to require great ingenuity to contrive an arrangement which might be a sort of gauntlet with finger-stalls, and which, without brutal treatment, should prevent the flexure of the hand and yet leave the bulbs of the fingers exposed. The method of measurement was unfortunately impracticable in some of the countries where identification was often called for. In India it had been tried and then entirely suppressed, because it was found impossible to exercise that constant supervision over widely distant stations which was needed to ensure the measurers doing their work accurately. Between 150,000 and 200,000 cards referring to as many criminals had been quite recently done away with, and cards of finger-prints are being substituted for them as fast as possible. He regretted that Mr. Henry, under whose administration this great change had been effected, was not present at the meeting to relate his experiences, which were entirely favourable to the finger-print method. On the other hand, he (Mr. Galton) felt surprised that the power of that method was as great as Mr. Henry found it to be. There was one very common pattern, that in which every finger showed an ulnar loop, 6 out of every 100 sets being of this kind. Consequently in a collection of 200,000 sets there would be no less than 12,000 of these, yet Mr. Henry seemed to use no method for sub-classifying them that differed in principle from those he (Mr. Galton) had employed. He wished to refer briefly to a visit recently made by himself to the Bureau of Identification at Cairo, organised within the last three years by Colonel Harvey Pasha. It was carried on in strict accordance with the recommendations of the Committee of which Dr. Garson had spoken, and it seemed to him as well

managed as could be. The difficulty arising from all measurements in the same individual tending to be alike large, if one of them was, or conversely, all small if one was small, had been ingeniously overcome by one of the officials entirely by himself, the number of cards, or rather papers, in each of the drawers being now nearly the same. The rapidity was surprising with which cards were hunted out from the collection in Cairo of between 18,000 and 19,000 of them, referring to as many different male adults. The women were dealt with by finger-prints alone, there being social prejudices in the past that interfere with their measurement. Similarly as regards minors, for it is obviously of no use to measure a growing boy.

He thought that every separate Identification Bureau would be likely to have something to teach to the rest, and much to learn from them, and he looked forward to a time, perhaps some few years hence, when a conference of executive officers might properly meet to interchange views and arrange as far as might be for a similarity of method.

Sir JAMES CRICHTON-BROWNE said he had listened to Dr. Garson's paper with great interest, and with high appreciation of the ingenuity and labour that had been expended on the investigation it described. The system of identification which Dr. Garson had inaugurated in this country would have important practical results. Certainty of detection was much more deterrent in the case of crime than severity of punishment, and it was possible that some of the criminals subjected to this mysterious process would, on their discharge from prison, go and sin no more, convinced that an alias would no longer afford any protection. Then, the data collected, when classified and arranged, would throw light on some racial, social, and pathological questions, and would be of special value, when comparison was possible between them and similar data, referring to other classes in the community besides criminals. Sir James desired strongly to insist on the importance of what Dr. Garson had said, that observations of this kind could only be efficiently carried out under the immediate supervision of a scientific expert. No matter how well trained, or how painstaking the prison officers might be, they would require to be supervised and checked, from time to time, in making measurements in which the utmost exactitude was essential. He recalled some observations on weight, made on the patients of a large lunatic hospital of which he had charge twenty-five years ago. There were 1,500 patients, and they were weighed monthly with a view to the early detection of pulmonary consumption, the symptoms of which are often masked in the insane, so that it may advance far without detection. All patients who had lost more than three pounds in the month were reported to the medical officers for special physical examination. The weighing was carried out, not by ordinary nurses and attendants, but by special officers. Well, on one occasion the medical officers tested the monthly records, going over all the weighing themselves, and they found about 75 per cent. of error, the human bias vitiating such investigations being revealed in the fact that there was a general exaggeration of weight. When patients were reputed to have lost weight there were special inquiries, and a good deal of trouble was imposed on all concerned. Sir James inquired whether the conformateur had ever been employed for the identification of criminals.

In reply Dr. GARSON said that the dilemma in which Mr. MacIver found

himself was the result of a deduction he had made for himself from incorrect premises. There existed no such incompatibility as Mr. MacIver had stated, in the use of the measurements of the head mentioned, for showing racial as well as individual characteristics. In all races of people these measurements have a considerable range of variation, and in mixed races they are but slightly correlated; for these reasons they are admirably adapted to demonstrate the individuality of persons measured and likewise for purposes of classification, the special desiderata in criminal anthropology. They are equally well adapted for indicating race characters, because in different races they vary proportionately to one another very considerably, but in persons of the same race, if the race be what we term pure, their proportionate variation is small or has a nearly similar ratio. The absolute head-lengths of two persons may differ considerably, and yet the heads may have identically the same morphological formation if the breadth of the longer one be sufficiently great to make both proportionately alike—in other words, if the measurements of length and breadth in each give the same cephalic index, or place them together in any scheme by which the relative proportions of the two measurements are shown. In criminal work the direct linear dimensions of parts are used, while for distinguishing race characters it is relative proportion which is sought for and used, the actual size of the head being usually expressed by cubic dimension or by some empirical formula worked out from the linear dimensions. From the same set of measurements, therefore, the two kinds of information required for totally different purposes may be equally well ascertained. The real determining cause of the selection of the same measurements for both purposes, apart from their intrinsic suitability for each, is no doubt due to the fact that, of all measurements which may be taken of the head, these are the ones which can be obtained with the greatest degree of accuracy, a matter of vital importance in criminal identification, and no less important in ascertaining race characters.

The opinion Colonel Garsia has expressed regarding the new system of identification is indeed high testimony in its favour, as no one is better able than he is, from practical experience of both it and the old system, to form a comparative estimate of their relative efficiency. When the new system was introduced Colonel Garsia was Secretary to the Prison Commissioners, and it is due in great measure to him that the portion of it which is done in the prisons was begun and carried on by the prison officials with the greatest good-will and zeal. The introduction of something new, entailing additional work without corresponding pecuniary advantages, is in any organised service usually beset with many difficulties. In this case nothing of the kind was experienced, and he could not speak in too high terms of the loyal support and co-operation he had had throughout in the work from one and all of the prison officials. He was also greatly indebted to Colonel Garsia, and to his successor, Major Clayton, for the assistance they had at all times given him in connection with his duties.

In reply to Mr. Galton, he desired it to be clearly understood that his own remarks on classification by finger-prints apply to their use for this purpose on a large scale without the aid of measurements; as is being attempted in India. He himself used a sub-classification by means of them, in conjunction with measurements, and was contemplating still further developments in this direction, but was not going to say more on the subject that night, as he hoped to make it the

subject of a subsequent paper. The formula of the finger impressions has been for the last two years the means by which individual cards are picked out, after the drawer or division of the drawer, wherein the card sought for should be, has been determined by the measurements. It was very interesting to have from Mr. Galton an account of his personal visit to the Identification Laboratory at Cairo, and of the very excellent work which the speaker knew was being done in Egypt by his friend Colonel Harvey.

M. Bertillon claims that in Paris the use of his system has been a deterrent to crime such as Sir James Crichton-Browne has anticipated: certainly it has been followed by a diminution in the use of *aliases*. Before anything can be said as to the deterrent effect of the system in this country it will require to be more extensively used than at present. The conformateur has not been used in the identification of criminals, and whether there is any scope for its use in this field is extremely doubtful, it being only in part an instrument of precision. The same difficulty as occurs in classifying photographs would hold good with respect to the classification of the outlines of the head obtained by means of it.

The PRESIDENT complimented Dr. Garson on his lucid explanation of a difficult and complicated subject; and while he agreed with him that the system was effective in its working, he regretted at the same time the absence of Mr. Henry, who, after trying the Bertillon system in India, had abandoned it for finger-prints alone. Committees had sat in India and in London on the comparative merits of the two methods of identification of criminals, and had come to opposite conclusions; so that in India the finger-prints were considered sufficient, while the English committee rejected the finger-prints except as an accessory, and adopted the more complicated metric system. On these grounds he thought there was still room for further argument.