two laboratory magazines corresponding to the extremes of temperature, the heat of the tropics and the intense cold of the Arctic. These two magazines are appropriately christened "India" and "Siberia" respectively. Of the two, the former is the more dangerous. Before entering the magazine the temperature of the interior is carefully noted through a peephole upon the large thermometer suspended within.

In view of the extreme and numerous precautions adopted at these works, accidents are of comparatively rare occurrence. At times, however, catastrophes, despite the measures observed, happen, but they are invariably of a comparatively small character. The rigorous regulations contained in the British Government's Explosives Act passed in 1875 conduce to the safety of the employees. The works are under the management of Mr. C. O. Lundholm, who has been associated for over thirty years with the Nobel works, and with the late Mr. Nobel himself, to whose courtesy we are indebted for the information contained in this article. Although the principal explosive works of the Nobel company are located at Ardeer, distributed over various parts of the country are cognate concerns associated with this Nobel industry, devoted to the manufacture of fuses, detonators, fulminate of mercury, and ammunition for all types of ordnance, so that the Nobel enterprise is in every respect one of the largest and most successful industries in Great Britain.

THE INFLUENCE OF PROFESSION ON THE SHAPE OF THE HAND.*

BY DR. ALFRED GRADENWITZ.

Though the human hand seems to be a fairly uniform structure, it really shows a differentiation as wide as that of the features of the face.

It is a well-known fact that the character of an individual can in a measure be read in his features, and a similar connection with character can be found in the form of the hand. The hand, however has a closer connection with actual occupation.

Whereas the influence of vocation on the traits (apart from a natural disposition for a certain craft that may lead to its adoption) is due mainly to a particular turn of mind connected with and produced by that vocation, the influence exerted on the shape of the hand is mainly of a physical nature. The continual repetition of the same kind of manual work results in a permanent alteration of the skin and muscles of the hand, as well as a transformation of the bones (atrophy or thickening of certain parts), displacement of the joints, etc., for in repeating a given manipulation over and over again, the palm and the balls of the thumb and little finger are called upon continually to perform the same action, leading to a permanent strain on and wear and tear of given parts of the hand.

The most obvious alterations due to occupation are observed in the case of heavy manual laborers, who have coarse and clumsy hands with short, thick, and callous fingers, the balls of the thumb and the little finger being especially developed, and the skin being horny and covered with fissures. While these properties generally are especially striking in the right hand, it is sometimes even more interesting to study the left hand of individuals, as for instance in the case of a smith, who by continually using this hand to seize the heavy tongs, develops very marked balls and projecting broadened finger tips (Fig. 1). The thumb of his left hand in fact is used continually in pressing on the tongs, and so becomes especially strong. The right hand shows the marks of its continual use in handling the heavy hammer, while the fingers assume a shortened, clumsy shape. Similar facts, though to a less degree, are stated in the case of locksmiths.

A very striking sample of a deformed hand is represented in Fig. 2, which shows the hand of a shoemaker. This is characterized by the strikingly broad and flat thumb, while the fingers are likewise broadened and flattened at the top. This deformation is due to the continual pressure exerted in cutting the leather for the heels and soles, which operation calls for considerable strength, the fingers being set firmly against the surface of the hard leather, while the knife is kept in the fist. A continual pressure is furthermore brought to bear on the finger tips in working the heavy material, while the callous balls become strikingly thickened. The shape of the right-hand forefinger is also characteristic of the profession, the surface turned toward the thumb being flattened considerably, so as to give the finger a tapering form. This is due to the continual use of that part of the forefinger in seizing and fitting shoenails and tacks, resulting in a resorption of both the bone and flesh. The left thumb being used mainly to keep the object in position in nailing the leather, is not quite as broad and flat as the right-hand thumb. The striking deflection of the right thumb is well visible in Fig. 2.

Another type of hand, viz., that of a typesetter, is represented in Fig. 3. This is of a slender, regular shape, showing that the work done is not heavy. The actions connected with his profession are mainly performed by means of the thumb and forefinger of the right hand, the tips being used nearly exclusively in picking the type from the cases and inserting it in a narrow "stick" held in the left hand. This continual seizing by means of the thumb and forefinger tips is bound to result in an atrophy of the bones and tissues, which is especially marked in the surfaces turned toward each other. Both the thumb and the forefinger of the right hand accordingly show a tapering form in their upper parts, while the remaining fingers retain their normal broad tips. The left-hand thumb, owing to the permanent pressure exerted by the type box, is flattened and broadened at the tip.

The hand of a tailor, with smooth palm, likewise shows a striking difference from that characteristic of a man who does heavy work. The forefinger of the left hand of a tailor is especially characteristic, as the lateral surface turned toward the thumb shows a striking wear and tear at the tip, giving the finger a pointed shape. This phenomenon is due to the needle continually sliding over this part of the finger, which, as it were, serves as support to the needle, the thumb and forefinger holding the material.

After examining the hands of representatives of certain handicrafts, it will be interesting to study that of an artist. The hands represented in Figs. 5 and 6 are those of a pianist, which show some especially characteristic features. In fact, all of the ten fingers are remarkably flat at the tips on the side coming in contact with the keys of the instrument, as a consequence of the variable pressure permanently exerted on the latter. Furthermore, the fingers are strikingly long, as their members, in swiftly touching the keys of high and low notes, are loosened continually. On the other hand, the thumb and little finger, which spread out in opposite directions, are elongated to a considerable degree, and the other fingers, as well as the remainder of the hand, are likewise affected by this process.

While a study of the different types of hand is bound to appeal to the lover of psychology and sociology, it has been found recently to be a valuable aid to the criminal police in ascertaining the profession of a suspect. Like the various methods of determining the physical characteristics of an individual, which have been suggested in the course of recent years, an investigation of these factors may in fact give useful hints as to the identity of an individual.

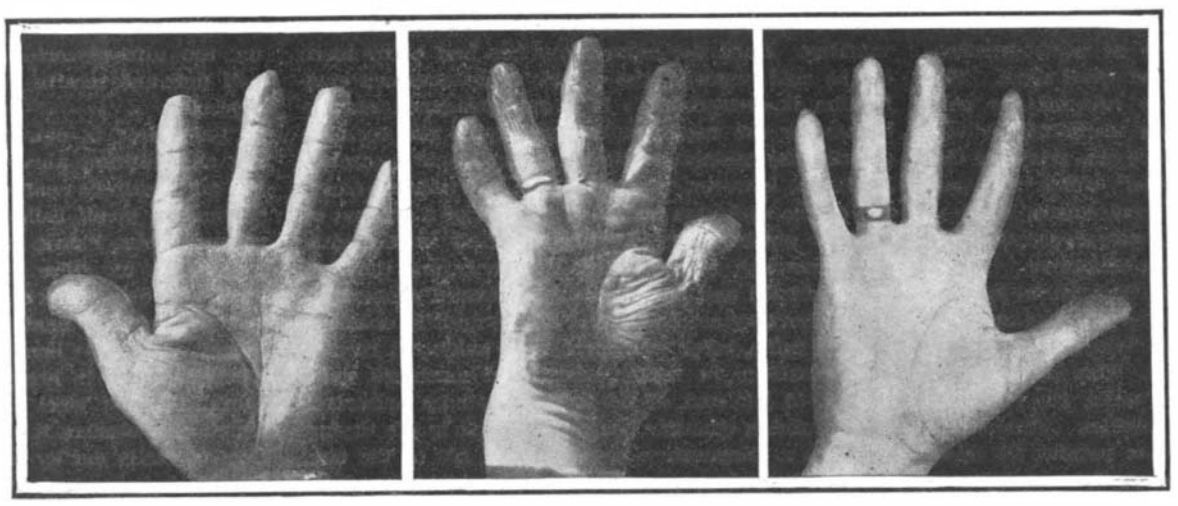

Fig. 1.—The Left Hand of a Smith.

Fig. 2.—Right Hand of a Shoemaker.

Fig. 3.—Right Hand of a Typesetter.

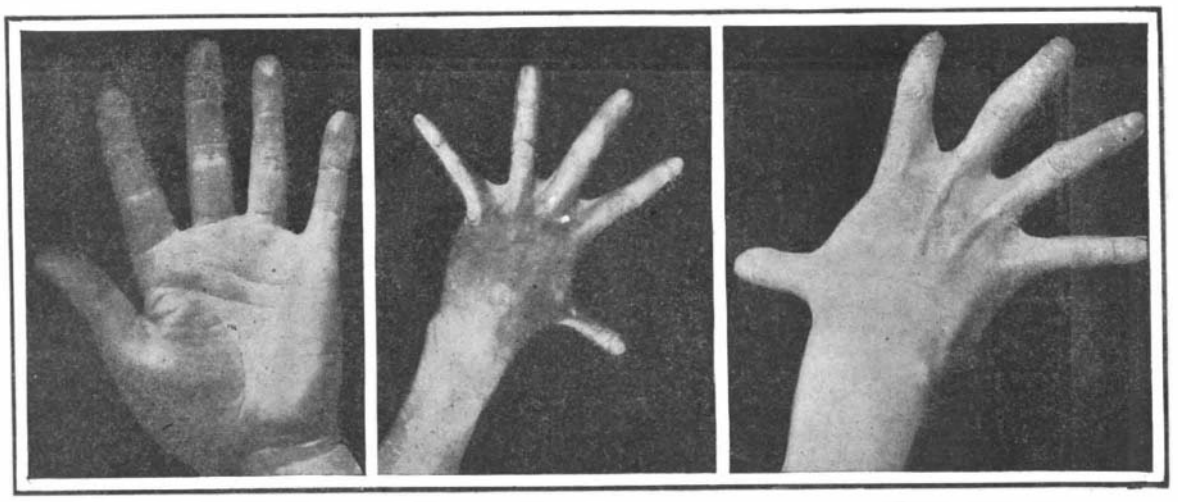

Fig. 4.—Left Hand of a Tailor.

Fig. 5.—Left Hand of a Pianist.

Fig. 6.—Right Hand of a Pianist.

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* With six photographs by Carl F. Schroeder, Magdeburg.

DR. BRANLY'S APPARATUS FOR CONTROL OF DISTANT MECHANICAL EFFECTS.

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

Dr. Branly's latest apparatus, which allows of controlling different kinds of mechanical effects at a distance, has awakened great interest owing to the applications which it is likely to receive in practice. The apparatus enables an operator in a distant station to control by means of radio-telegraphy the lighting of lamps, explosions of mines, sending up rockets, mechanical movements such as the boring of metals, and any kind of action which is brought about by electro-magnets. Steering of torpedoes is one of the interesting uses of Prof. Branly's system, and other uses in military operations are at once apparent.

The principle of the system lies in the use of a series of distributing disks placed on a shaft which is driven by an electric motor. Suppose the operator wishes to light electric lamps at the distant point. In the lamp circuit is a relay which opens or closes it. This relay is worked from the circuit of a coherer and sensitive relay, so that when the operator sends a wave signal the coherer responds, closing the first circuit as in radio-telegraphy. This causes the lamp relay to operate and the lamps are lighted. What is now desired is to have the operator control a number of such apparatus at a distance. For this purpose each apparatus (supposing there are four of them such as he uses in his laboratory for demonstration, namely, a set of incandescent lamps, a revolver which is fired by an electro-magnet, an electric fan and an electro-magnet lifting a cannon ball) uses a separate disk placed on the shaft, with a fifth disk for controlling the motor. Each disk carries a projecting sector which makes contact with a brush during one-fifth of a revolution. During this period he can send sparks to operate this particular apparatus, and no other.

One of the principal features of the system is what Prof. Branly calls the "automatic telegraph." It serves to show the operator at the sending post the proper moment for sending the signals for controlling the different effects. These check signals are given him by a radio-telegram which is received upon a band of paper from a Morse receiver placed at the sending post. An apparatus placed at the receiving station sends these signals at the proper time by means of a spark coil connected so as to operate at certain periods by a special revolving disk. The latter is mounted upon the same shaft which carries the other disks. On the automatic telegraph disk are five groups of teeth, and each group gives an appropriate set of sparks so as to form a signal. A complete revolution of the disk thus sends five signals to the sending post to be recorded upon the paper, and these signals occur at equal intervals, or one-fifth revolution, corresponding to about four inches on the paper strip. On the upper band of this paper strip there are five signals, formed of from one to five dots. Suppose that there are four working disks on the shaft,