the transverse axis than in the long axis of the limb, to the extent of ⅛ on the flexor surface of the upper limb and ¼ on the extensor surface (Landois). It is doubtful if exercise improves sensitive­ness, as Francis Galton found that the performances of blind boys were not superior to those of other boys, and he says that “ the guidance of the blind depends mainly on the multitude of col­lateral indications, to which they give much heed, and not their superiority to any one of them.” When the skin is moistened with indifferent fluids sensibility is increased. Suslowa made the curious discovery that, if the area between two points distinctly felt be tickled or be stimulated by a weak electric current, the impressions are fused. Stretching the skin, and baths in water containing carbonic acid or common salt, increase the power of localizing tactile impressions. In experimenting with the com­passes, it will be found that a smaller distance can be distinguished if one proceeds from greater to smaller distances than in the re­verse direction. A smaller distance can also be detected when the points of the compasses are placed one after the other on the skin than when they are placed simultaneously. If the points of the compasses are unequally heated, the sensation of two contacts becomes confused. An anaemic condition, or a state of venous con­gestion, or the application of cold, or violent stretching of the skin, or the use of such substances as atropine, daturin, morphia, strychnine, alcohol, bromide of potassium, cannabin, and hydrate of chloral blunt sensibility. The only active substance said to increase it is caffein.

*Absolute sensitiveness,* as indicated by a *sense of pressure,* has been determined by various methods. Two different weights are placed on the part, and the smallest difference in weight that can be perceived is noted. Weber placed small weights directly on the skin; Aubert and Kammler loaded small plates; Dohrn made use of a balance, having a blunt point at one end of the beam, rest­ing on the skin, whilst weights were placed on the other end of the beam to equalize the pressure; Eulenberg invented an instrument like a spiral spring paper-clip or balance (the baræsthesiometer), having an index showing the pressure in grammes; Goltz employed an india-rubber tube filled with water, and this, “ to ensure a con­stant surface of contact, bent at one spot over a piece of cork, is touched at that spot by the cutaneous part to be examined, and, by rhythmically exerted pressure, waves analogous to those of the arterial pulse are produced in the tube ” (Hermann); and Landois invented a mercurial balance, enabling him to make rapid variations in the weight without giving rise to any shock (figured in Landois and Stirling’s *Physiology,* p. 1155). These methods have given the following general results. (1) The greatest acuteness is on the forehead, temples, and back of the hand and forearm, which detect a pressure of ∙002 gramme; fingers detect ∙005 to ∙015 gramme; the chin, abdomen, and nose ∙04 to ∙05 gramme. (2) Goltz’s method gives the same general results as Weber’s experiment with the compasses, with the exception that the tip of the tongue has its sensation of pressure much lower in the scale than its sensation of touch. (3) Eulenberg found the following gradations in the fineness of the pressure sense:—the forehead, lips, back of the cheeks, and temples appreciate differences of to (200 : 205 to 300 : 310 grammes). The back of the last phalanx of the fingers, the forearm, hand, 1st and 2d phalanges, the palmar surface of the hand, forearm, and upper arm distinguish differences of 1/10 to 1/20 (200 : 220 to 200 : 210 grammes). The front of the leg and thigh is similar to the forearm. Then follow the back of the foot and toes, the sole of the foot, and the back of the leg and thigh. Dohrn placed a weight of 1 gramme on the skin, and then determined the east additional weight that could be detected, with this result:— 3d phalanx of finger, ∙499 gramme ; back of the foot, ∙5 gramme ; 2d phalanx, ∙771 gramme; 1st phalanx, ∙82 gramme; leg, 1 gramme; back of hand, 1T56 grammes; palm, 1∙108 grammes ; patella, 1∙5 grammes; forearm, 1∙99 grammes; umbilicus, 3∙5 grammes; and back, 3∙8 grammes (Landois and Stirling). (4) In passing from light to heavier weights, the acuteness increases at once, a maximum is reached, and then with heavy weights the power of distinguishing the differences diminishes (Hering, Bieder- mann). (5) A sensation of pressure after the weights have been removed may be noticed *(after-pressure sensation),* especially if the weight be considerable. (6) Valentine noticed that, if the finger were held against a blunt-toothed wheel, and the wheel were rotated with a certain rapidity, he felt a *smooth* margin. This was ex­perienced when the intervals of time between the contacts of suc­cessive teeth were less than from 1/480 to 1/610 of a second. The same experiment can be readily made by holding the finger over the holes in one of the outermost circles of a large syren rotating quickly : the sensations of individual holes become fused, so as to give rise to a feeling of touching a slit. (7) Vibrations of strings are de­tected even when the number is about 1500 per second ; above this the sensation of vibration ceases. By attaching bristles to the prongs of tuning forks, and bringing these into contact with the lip or tongue, sensations of a very acute character are experienced, which are most intense when the forks vibrate from 600 to 1500 per second.

*Information from Tactile Impressions.—*These enable us to come to the following conclusions. (1) We note the existence of some­thing touching the sensory surface. (2) From the intensity of the sensation we determine the weight, tension, or intensity of the pres­sure. This sensation is in the first instance referred to the skin, but after the pressure has reached a certain amount muscular sensa­tions are also experienced—the so-called muscular sense. (3) The locality of the part touched is at once determined, and from this the probable position of the touching body. Like the visual field, to which all retinal impressions are referred, point for point, there is a tactile field, to which all points on the skin surface may be referred. (4) By touching a body at various points, from the difference of pressure and from a comparison of the positions of various points in the tactile field we judge of the configuration of the body. A number of “ tactile pictures ” are obtained by pass­ing the skin over the touched body, and the shape of the body is further determined by a knowledge of the muscular movements necessary to bring the cutaneous surface into contact with different portions of it. If there is abnormal displacement of position, a false conception may arise as to the shape of the body. Thus, if a small marble or a pea be placed between the index and middle finger so as to touch (with the palm downwards) the outer side of the index finger and the inner side of the middle finger, a sensation of touching *one* round body is experienced ; but if the fingers be crossed, so that the marble touches the inner side of the index finger and the outer side of the middle finger, there will be a feeling of *two* round bodies, because in these circumstances there is added to the feelings of contact a feeling of distortion (or of muscular action) like what would take place if the fingers, for pur­poses of touch, were placed in that abnormal position. Again, as showing that our knowledge of the tactile field is precise, there is the well-known fact that when a piece of skin is transplanted from the forehead to the nose, in the operation for removing a deformity of the nose arising from lupus or other ulcerative disease, the patient feels the new nasal part as if it were his fore­head, and he may have the curious sensation of a nasal instead of a frontal headache. (5) From the number of points touched we judge as to the smoothness or roughness of a body. A body having a uniformly level surface, like a billiard ball, is smooth ; a body having points irregular in size and number in a given area is rough ; and if the points are very close together it gives rise to a sensation, like that of the pile of velvet, almost intolerable to some indivi­duals. Again, if the pressure is so uniform as not to be felt, as when the body is immersed in water (paradoxical as this may seem, it is the case that the sensation of contact is felt only at the limit of the fluid), we experience the sensation of being in contact with a fluid. (6) Lastly, it would appear that touch is always the result of varia­tion of pressure. No portion of the body when touching anything can be regarded as absolutely motionless, and the slight oscillations of the sensory surface, and in many cases of the body touched, produce those variations of pressure on which touch depends.

*Theories as to Touch.—*To explain the phenomenon of the tactile field, and more especially the remarkable variations of tactile sensibility above described, various theories have been advanced. (1) The one most generally known is that of E. H. Weber, as modified or restated by Lotze, Meissner, Czermak, and others. It assumes that, whilst we refer every tactile sensation to a certain position in the tactile field, we do not refer it merely to a point, but to a circular or oval area on the skin, called a circle of sensibility. Further, it is assumed that if two such circles touch or overlap they cannot be individually perceived, and that they can only be so individually perceived when one or more circles of sensibility inter­vene, or, in other words, when there is a “non-irri­tated sensory ele­ment ” between the two points touched (figs. 10 and 11).

Each circle of sensibility may be supposed to be innervated by a distinct fibre. Thus, suppose the sensitive surface of the skin to be diagrammatically represented as in figs. 10 and 11, each square would be a “ circle of sensibility.” In more sensitive regions the squares would be smaller and the number of nerve terminations greater than in less sensitive regions. In fig. 10 the area contains nine “circles” and has nine nerve terminations, whilst in fig. 11, although the total area is the same, there are thirty-six “circles ” and thirty-six nerve filaments. If the points of the compasses be placed at *a* and *c* in fig. 10 the sensation will be that of one point; there would also be a sensation of one point if they were placed at *c*