adventitia. If applied to large arteries the vessel should be caught, freed from its sheath and surrounding tissues, and held by one pair of forceps at a point above where it is desired to rupture the inner coats. The cut end of

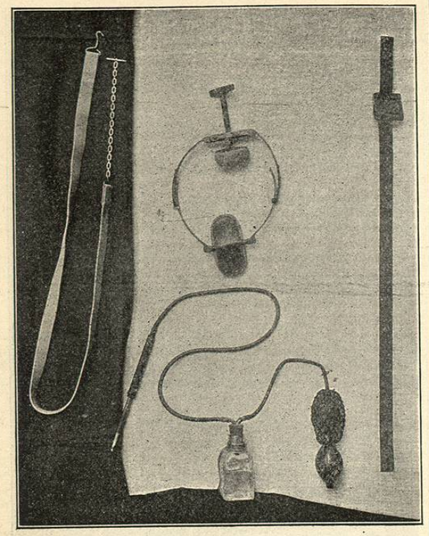

FIG. 2601.—Other Apparatus used in Arresting Hemorrhage. On the left-hand side, Esmarch's flat tourniquet; on the right, emergency tourniquet; in the centre, above, Skey's arterial compressor; in the centre, below, thermo-cautery apparatus.

the vessel is then caught by another forceps and twisted until the rupture is felt to occur. It can scarcely be called a safe method and should be confined to small and cutaneous vessels. In such cases it is unnecessary to apply more than the one forceps and that to the cut end.

The *cautery* is still sometimes found useful as a hæmostatic, particularly to arrest oozing from surfaces that are deep and inaccessible or where, because of the thinness of the tissue or its extreme friability, a ligature is contraindicated. The Paquelin thermocautery is now generally used, and for hæmostatic purposes the point should be only of a dull red heat, just turning black. If too hot it does not arrest the bleeding, and if too cold it sticks to the tissue. It is said to be less effective as a hæmostatic than the old cautery irons, but is much more convenient.

Hemorrhage from bone is sometimes troublesome. The bleeding vessel may have retracted into a bony canal, as happens, for example, in the case of the middle meningeal in the Hartley-Krause operation for removal of the Gasserian ganglion. If the vessel cannot be caught the bony canal may be plugged with gauze, an ivory peg or a bit of sterilized wood. For the oozing from the edges of divided bone Victor Horsley has prepared an antiseptic wax. It is composed of beeswax 7 parts, almond oil 1 part, and salicylic acid 1 part. It is often very helpful. Suprarenal extract or adrenalin may be found the most satisfactory of all. The writer used it successfully in a case of secondary hemorrhage in acute osteomyelitis.

Cold, locally applied, in the form of Leiter's tubes, or cracked ice, may be used in robust patients, for the arrest of oozing. It acts by stimulating the muscular coats to contract and reflexly may stimulate vessels situated beneath the surface. Cold should generally be avoided in the weak and in acute anæmia.

Heat, preferably in the form of hot saline solution, has a decidedly styptic action on tissues. The temperature may be 110° to 115° F., or as hot as the hand can bear.

Hot steam has been applied to bleeding surfaces as a styptic by Snegirew, with satisfactory results. He used it at a temperature of 212° F. in the cavity of the uterus (Senn).

Treatment of the Acute Anæmia resulting from hæmorrhage is only second in importance to the arrest of the bleeding which caused it. Stimulants must be exhibited with caution until the bleeding is stopped, as their effect is often to increase intravascular pressure. They have an important place in the treatment when used with discretion and good judgment. Opium is also valuable as an equalizer of the circulation and a determinant of blood to the cerebral centres.

Transfusion.—At the head of the list, however, stands normal saline solution, six-tenths of one-per-cent. solution. It may quickly be prepared by adding a drachm of salt to the pint of boiled water, cooled to a temperature of 100° F. A pint thrown into the rectum is useful. Much better and quicker results are obtained by injecting it beneath the skin in the infraclavicular and submammary regions. A double-branched tube with a hollow needle attached to each branch affords the most expedi-

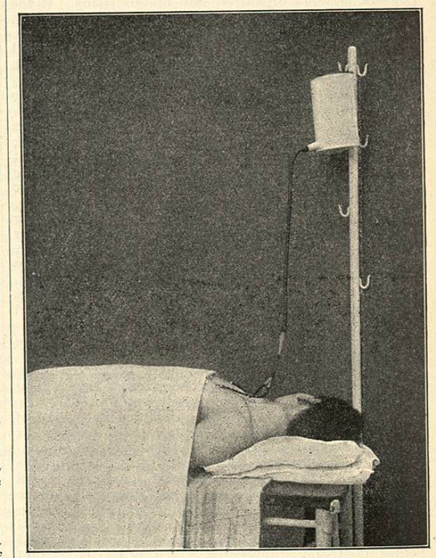

FIG. 2602.—Apparatus for Subcutaneous and Intravenous Injection of Saline Solution.

tious means of acomplishing this. Two pints can thus be introduced in from ten to twenty minutes. While it is being injected gentle massage should be continuously practised.

Many prefer in extreme cases to introduce the saline solution directly into the circulation through one of the superficial veins. A vein of the arm just above the elbow is usually selected. This little operation will be most readily accomplished by carefully laying bare the vein selected for a distance of an inch and then carefully passing beneath it a double ligature; tie the distal ligature; with a sharp knife make an incision in the wall of the vein just large enough to admit the end of the needle or nozzle; then tie the proximal ligature around the vein and the included needle or nozzle. As much as two or three pints of solution may be introduced. Then withdraw the nozzle and tie the proximal ligature, or pass a fresh ligature around the vein at that point. Precautions must be taken not to permit any air to enter.

In extreme cases until the bleeding is stopped elastic bands may be applied to the extremities close up to the body, thus saving the patient's blood. The foot of the bed should be raised eight or ten inches, thus sending the major part of the blood toward the great centres of the nervous and circulatory systems. This is a most effective method of auto-transfusion.

George E. Armstrong.

HEMORRHOIDS. See *Anus*, etc.

HEMP. See *Cannabis Sativa*.

HEMP, INDIAN. See *Cannabis Indica*.

HENBANE.—HYOSCYAMUS. "The dried leaves and flowering tops of *Hyoscyamus niger* L. (fam. *Solanaceæ*) collected from biennial plants" (U. S. P.). Of the three forms in which this plant presents itself, the most efficient one is insured by the language of this definition and of the accompanying description. The plant grows both as an annual and as a biennial. The former, and the latter during the first year of its growth, are to be rejected. The last-mentioned bears no flowers and is excluded by the words "flowering tops." Flowers are supplied by the annual form, but they lack, to a great extent, the "purple veins" called for by the description. Thus the highly active second year's growth of the biennial plant is the only form which affords a drug markedly characterized by yellow flowers with purple veins.

Henbane is a native of Europe and Western Asia, where it is a very common and abundant weed. It is also cultivated for medicinal purposes. Rarely, it occurs as a weed in the United States. It looks somewhat like the stramonium, but is not so large and is even more coarse-looking and more strongly viscid-hairy. The habit of the inflorescence is shown in the accompanying cut.

The following is the description of the drug:

Coarsely, roughly, and glandularly hairy throughout, except the corollas; larger leaves shortly and broadly petioled, 15 to 25 cm. (6 to 10 in.) long, and two thirds as broad, the upper becoming smaller and sessile; blades angularly ovate, acute, coarsely and angularly toothed or lobed, grayish-green or slightly yellowish-green; flowers in pseudo-racemes, short-pedicelled, the calyx cylindraceous, somewhat contracted above the ovary, unequally five-toothed, the teeth triangular, acute, the corolla campanulate, five-lobed, sulphur yellow, with deep purple veins; capsule a two-celled pyxis; odor heavy, narcotic; taste bitter, somewhat acrid. From tobacco, henbane is distinguished by its incised leaves, from stramonium by its hairiness, and from belladonna by both these characters.

A full account of the composition and properties of henbane would constitute, to a great extent, a duplication of our account of belladonna. It may therefore be most profitably considered by comparing it with that drug.

The alkaloidal percentage of henbane is very much lower than that of belladonna. Some authorities place it below one-tenth of one per cent., while others state it as high as three-tenths. The best authorities agree upon 0.2 to 0.25 per cent. as the standard. The most of this alkaloid is *hyoscyamine*, separately treated Whether any atropine is present, is disputed, but if so, the amount is unimportant. Atropine may readily form during manufacturing operations, by conversion of the hyoscyamine. The most important variation from belladonna is in the presence of a small amount of hyoscine or scopolamine, also separately considered, in its alphabetical order.

The general similarity of henbane to belladonna in properties and uses will readily be inferred from its composition; yet the slight characteristic differences stated are sufficient to establish noticeable differences in these

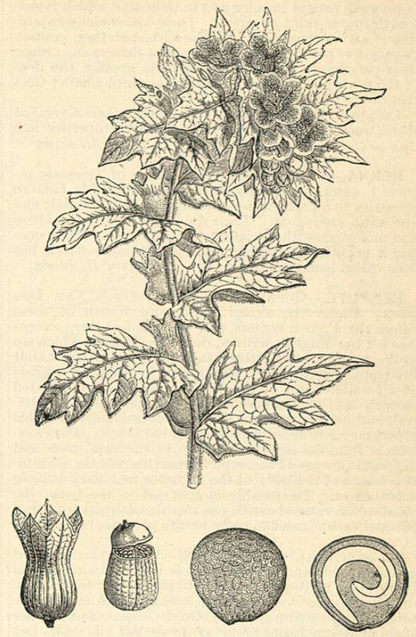

FIG. 2603.—Henbane, Plant and Fruit (about one-half natural size) – Seed Enlarged. (Baillon.)

directions. These differences may be stated generally by saying that henbane is more distinctly sedative than belladonna, and that this sedative action extends to the cerebral, motor, and sensory functions, though less so to the latter. The marked tendency to delirium resulting from the use of belladonna may be quite absent in that of henbane, or even the opposite effect can be induced.

Hence the distinct uses of henbane. It is scarcely employed in eye practice, though it produces very similar effects to those of atropine. If distinct cerebral-depressant effects are desired, it is better to give hyoscine itself, but when we wish the effects of belladonna, but desire to avoid its mental disturbances, henbane is chosen. Its commonest uses are intestinal and cystic, or renal. The former use is mostly in combination with purgatives which would otherwise be griping. At the same time that this unpleasant effect is averted, the henbane itself powerfully promotes peristalsis, and is therefore laxative, even excelling belladonna in this respect. The second-named use is as a sedative diuretic, relieving both painful and spasmodic conditions of the genito-urinary tract. Here again it is usually combined with other drugs, such local diuretics as buchu, kava, or oil of juniper. It is, however, often given alone in colic, cystitis, calculus, etc. It is commonly given in larger doses than belladonna. There are official an extract, the dose of which is 0.3 to 1 gm. (gr. ss.–iss.); a fluid extract, dose

0.3 to 1 c.c. (ɱ v. to xv.); a 15-per-cent. tincture, dose 2 to 6 c.c. (fl ʒ ss.–iss. or ij.).

Henbane Seeds, though unofficial, are largely employed. They are light-brown, broadly kidney-shaped, and flattened, 1 to 1.5 mm. long and nearly as broad, and finely pitted. Thus they bear a close resemblance to stramonium seed, except in color and in their size, which is one-fourth to one-third as great. Their alkaloidal composition is about the same as of the herb, but they contain twenty-five per cent. of fixed oil, and a little resin. Since their percentage of alkaloid is a little greater, the dose of the seeds is about one-fourth or one-third smaller than that of the herb.

There are eleven species of hyoscyamus, and several of them, notably *H. album* L., have similar properties and uses to those of *H. niger*. *Henry H. Rusby.*

HENNA.—Under this name the leaves of *Lawsonia inermis* L. (fam. *Lythraceæ*) are extensively used in Eastern countries as a pigment for coloring the skin and hair and also as an astringent. Their use in jaundice is doubtless due to a superstition relating to their color. They contain a peculiar astringent resinous substance which has been called henotannic acid. *Henry H. Rusby.*

HENPUYE.—Goundou, Anakhré, Gros Nez, Dog Nose. Under the second, third, and fourth of these names the French writers, and under all of them except *gros nez* the English writers, describe a disease which up to the present has not been found outside of tropical or sub-tropical countries. The trouble in question consists of a peculiar form of exostosis or bony tumor, situated on each side of the nose. The growth is always bilateral, and usually symmetrical, but occasionally one side grows larger or more rapidly than the other. The exostosis is from the external surfaces of the nasal bone and the nasal process of the superior maxillary bone, with involvement of the body of the superior maxillary bone in severe cases. The trouble is confined to the bone; the nasal cavities, nasal cartilages, mouth, or orbits not being affected except mechanically by the presence or pressure of the tumor.

Geographical Distribution.—When first noticed goundou, or henpuye, was supposed to be limited to the Ivory Coast of West Africa and to the district watered by the river Comoë.[1] Since then it has been found in the neighboring territory of the Gold Coast;[2] and further afield at Sierra Leone (*Jour. of Trop. Med.*, ii., 145); but in every case the sufferer was a negro. But cases have since been reported of a Malay being affected in Sumatra (*Jour. of Trop. Med.*, iii., 11), a native in Southern China (*Jour. of Trop. Med.*, iii., 110), and some negroes in Jamaica, West Indies.[3] The case of goundou reported from Singapore (*Jour. of Trop. Med.*, July 1st, 1901, p. 213) was probably not one of goundou at all, as the tumor was not solid but consisted of a shell of bone covering cerebral meninges. We may safely say that the disease is confined to tropical and sub-tropical countries, with a predilection for the negro race.

General Description and Course of the Disease.—The trouble generally commences with a cold in the head followed by headaches chiefly over the frontal region; these headaches last for about a year, when a slight fulness is noticed on each side of the nose; as this swelling increases the headaches are apt to disappear. Sometimes the tumor will continue to grow for a year or two only, and sometimes it will develop slowly for many years. The overlying skin is apparently quite normal, being freely movable and quite healthy in appearance. The tumors are non-fluctuating, grow slowly and almost symmetrically with no tendency to suppurate, have an ovoid shape with the long axis outward and downward, become intensely hard, but are not as a rule painful except in wet weather. There is no tenderness on pressure. The size varies from a pea to an orange or an ostrich's egg,[1] but a pigeon's egg may be taken as an average of the dimensions attained. Of course the countenance is terribly deformed. In some cases a bloody or purulent discharge from the nose has been observed; in others there has been neither discharge nor sore. The cartilages of the nose are not involved, nor is the nasal duct; and there is no epiphora. Sometimes the tumor will press upon the anterior nares and compress the cavities, with the result that the voice obtains a nasal twang. The orbital cavities may be similarly pressed upon, but generally the growth of the tumor causes first a squint, then the patient may have to flex his head in order to see over the tops of the tumors; and later on, the tumors becoming still larger, there is a total obstruction of vision. But the eyeball is not destroyed. In Maclaud's cases[1] the patients were free from tuberculosis and syphilis. Chalmer's cases[2] had all suffered from yaws.

Etiology.—The natives of the Ivory Coast believed in a divine or diabolical origin of the disease. Maclaud[1] advanced the theory that the trouble was parasitic, being due to the larvæ of some dipterous insect; but the bilateral and symmetrical nature of the complaint remain unexplained by this hypothesis. Further, for the acceptance of this theory, it would be necessary to know the particular insect or insects with their exact habitat, and to ascertain whether this insect is found in West Africa, China, Sumatra, and the West Indies. Chalmers[2] considers the disease the result of yaws or framboesia, which certainly seems more plausible; he asserts that goundou follows that disease, that it is caused by the absorption of the yaws poison from the mucous membrane of the nose and is carried by the lymphatics and small vessels through the foramina in the nasal process of the superior maxilla, and that in the cases which he observed there was a sore in and some discharge from the nose. But if goundou was caused by yaws there would have been hundreds of cases reported from the West Indies alone, where yaws has been carefully studied. Strachan considers it the result of atavism;[3] this theory seems the most probable of any, and, as in the somewhat similar case of the "horned men" of Africa, these bony outgrowths may be considered hereditary or at any rate characteristic of race. Of these "horned men" Macalister says "that outgrowths here may be really race characters is not to be entirely ridiculed, for the neighboring malar bone which here, according to O'Reilly's description, participates in the swelling, certainly shows certain race peculiarities, such as the bigger *Tuberositas malaris* of the Mongolians, and the *Processus marginalis*, whose race peculiarities have been pointed out by Werfer" (Bland Sutton, "Evolution and Disease," 1890, p. 197, English edition). It may be well to mention here the chief differences between goundou and the deformity of the horned men: (1) in the former the tumor is fairly parallel with the nasal bone, in the latter it is at right angles to it; (2) in goundou the exostosis is from the nasal process, in the "horned men" it is from the infraorbital ridge; (3) in goundou the malar bone is not affected, while it is apt to be involved in the latter condition.

Pathology.—The growth consists of a centre of cancellous bone, covered with a casing of hard compact bone, from which the periosteum can be very easily removed. The growth is in all probability an osteoplastic periostitis.

Treatment.—Iodide of potassium has been tried but without success. The only treatment is surgical. A longitudinal incision is made in the skin over the tumor, with perhaps a cross incision to allow more room, and the tumor can be removed with a saw, gouge, or bone forceps; the hemorrhage, which is slight, can generally be controlled by pressure; and under the ordinary aseptic precautions the parts unite by first intention.
R. J. E. Scott.

References:

[1] Maclaud: Archives de médecine navale, tome lxiii., p. 25.
[2] Chalmers: Lancet, London, 1900, i., p. 20.
[3] Strachan: Brit. Med. Journ., 1894, i., p. 189.

HEREDITY.—Heredity may be defined as a correlation between the variations of characteristics in individuals related to one another by birth.

The words used as the names of phenomena are apt to

influence our conceptions of their character. This is particularly true of heredity. No doubt, most persons think of heredity as similar to the inheritance of goods and chattels. To them a son has received from his father the color of his eyes very much in the same way that he may expect to receive his seal ring or his watch. Such an idea is entirely foreign to the scientific conception of heredity, and in using the term it is necessary to keep in mind always its metaphorical character in order not to confuse the metaphor with the reality that it represents. Scientifically heredity is merely a special case of the correlation of variations.

This correlation may be *direct*, as between father or mother and son or daughter, between grandfather and grandson, etc.; or it may be *collateral*, as between brothers, sisters, brothers and sisters, uncles or aunts and nephews or nieces, between cousins, etc. In man and the higher animals inheritance is always *biparental*. That is to say, every individual has two parents; but there are cases in which there is only one parent, as in certain insects and crustacea that produce young most frequently by means of parthenogenetic eggs, and among some of the lower animals and the plants, which frequently produce new individuals by means of buds, underground shoots, etc. In such cases inheritance is *uniparental*.

Of direct inheritance there are three important types: (1) *blended* inheritance, where the child is intermediate in character between the two parents, as in stature; (2) *exclusive* inheritance, where the character of the child is like that of one parent but not like the other, if they differ, as in the color of the eyes; (3) *particulate* inheritance, where the characters of both parents appear in the child, but do not blend; for example, a pup may have spots, some of which are of the color of the mother, while others are like the coat of the sire, or a boy may have a nose like his father and eyes like his mother.

Variability.—Variation is deviation from the type, and for most statistical inquiries the type taken as the standard is the arithmetical mean of the population or group. Deviations are of two kinds, abnormal, such as the "sports" of the horticulturist, and normal variations, which may be observed in every family or other group of individuals. The normal variations are found to be distributed about the mean in a way that may be expressed by certain mathematical formulæ derived from the theory of probability and chance (see articles *Evolution* and *Variation*). The relations most frequently met with are represented in Fig. 2604.

The rectangles in this figure taken together form what is called a polygon of frequency, and the flowing curve is a theoretical curve of chance, or probability, that has been fitted to the polygon, which represents graphically the observed facts. Now if we plot the curves of two sets of observations, employing units of scale of the same value in both, the differences in the forms of the curves will depend upon the number of individuals in the most frequent class, or *mode*, that is the tallest rectangle, and,

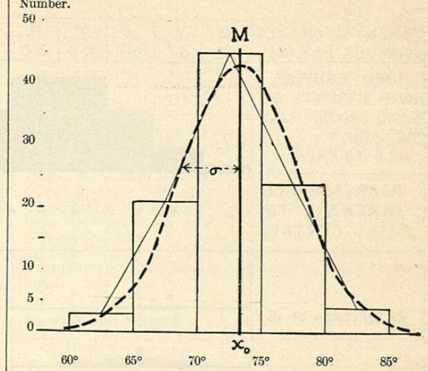

Fig. 2604.—Graphic Representation of a Series of Variations. Variation in the width of the angle at the apex of the shell in *Purpura lapillus*. Mx_o, position of the mean; σ, standard deviation.

supposing the curve to be symmetrical, upon the amount of *deviation* on either side of the mean. The amount of deviation, that is the *variability* of the group, is measured by what is called the *standard deviation* (the "mean error" of the mathematicians). This is obtained by multiplying the square of the deviation from the mean of each class by its frequency, adding all the results together, dividing by the total number of observations, and finding the square root of the quotient $\left(\sigma = \sqrt{\frac{\Sigma\,(x^2 f)}{n}}\right)$. The Greek letter σ is used as the symbol for this quantity. Its relation to the curve of frequency is shown at σ in Fig. 2604.

Correlation.—"Two variable organs are said to be correlated when the variation of one is accompanied on the average by more or less variation of the other, and in the same direction" (Galton, 1888). In order to determine the degree of *correlation* between two organs accurately, it is necessary to have a large number of observations and to arrange them in a "correlation table" like the one given below, Table I.

Table I.—Correlation in the Length of First Joint of Index Fingers of Women, Right and Left Hands. (From Whitely and Pearson.)

Left Hand (Relative Classes).	Right Hand (Subject Classes).													Totals.
Length of joint in inches.	1.95 to 2.00.	2.00 to 2.05.	2.05 to 2.10.	2.10 to 2.15.	2.15 to 2.20.	2.20 to 2.25.	2.25 to 2.30.	2.30 to 2.35.	2.35 to 2.40.	2.40 to 2.45.	2.45 to 2.50.	2.50 to 2.55.	2.55 to 2.60.	
1.90 to 1.95	1	1	1	....	....	....	....	....	....	....	....	....	....	3
1.95 to 2.00	1	2	....	....	....	....	....	....	....	....	....	....	....	3
2.00 to 2.05	1.5	7.5	13	4	....	4	....	....	....	....	....	....	....	27
2.05 to 2.10	1.5	2.5	12	17	3.5	1	....	....	....	....	....	....	....	37.5
2.10 to 2.15	....	....	3.5	21	32	7	1	....	....	....	....	....	....	64.5
2.15 to 2.20	....	....	....	4.5	38.75	35.5	9.75	1.5	....	....	....	....	....	90
2.20 to 2.25	....	....	....	1.5	7.25	45.25	45.25	5.25	0.5	....	....	....	....	105
2.25 to 2.30	....	....	....	....	1	8.25	36.5	28.5	2.25	....	....	....	....	76.5
2.30 to 2.35	....	....	....	....	....	....	7	41.25	24.5	3.25	....	....	....	76
2.35 to 2.40	....	....	....	....	....	....	1	5.5	17.75	13.5	0.25	....	....	38
2.40 to 2.45	....	....	....	....	....	....	....	....	3.5	12	6.5	0.5	....	22.5
2.45 to 2.50	....	....	....	....	....	....	....	....	1	2.75	1.75	0.5	....	6
2.50 to 2.55	....	....	....	....	....	....	....	....	....	....	1	....	0.5	1.5
2.55 to 2.60	....	....	....	....	....	....	....	....	....	....	....	....	0.5	0.5
Totals	5	13	29.5	48	82.5	98	100.5	82	49.5	31.5	9.5	1	1	551