I have also used papain in several cases where there was no perforation, but where a firm plug of wax and epithelium had caked together, and could not be dislodged by syringing. The papain solution has invariably greatly facilitated the subsequent removal.

It seems likely that papain might prove of service in the removal of some of the foreign bodies occasionally met with in the ear, and also in treating otomycosis, but I have not yet had an opportunity of testing this.

In all my cases I have used Finkler's papain as supplied to me by Messrs J. Robertson & Co. of Edinburgh. There is another preparation in the market known as Christy's, but of this I have no experience. According to Herschell it has somewhat different properties to Finkler's. It should be noted that the solution does not keep well, and therefore it requires to be freshly prepared every few days. Messrs Burroughs, Wellcome, & Co. make 2-grain papain tabloids, which I thought might be useful to make the fresh solution whenever required. I have, however, not tried them yet, as I find the solution made from them is very thick and muddy.

At first I used the papain in simple solution either in water or camphor water, but afterwards I inclined to think that it acted better with the addition of some soda, so I have lately been adding five grains of the bicarbonate of soda to the half ounce of papain solution.

It seems to me possible that papain might be of some service in general surgery to shorten the period of treatment in cases of caries of bone, or to render aseptic long narrow sinuses which contain debris, etc., in which germs hide from antiseptic applications. However, that is merely a suggestion, and one which falls outside my province.

V.—NOTES ON THE NATURE AND TREATMENT OF FLAT-FOOT.

By T. S. Ellis, Consulting Surgeon to the General Infirmary at Gloucester.

I have myself personally suffered from an extreme condition of flat-foot, the result of an accident twenty-two years ago. My recovery, long since practically complete, was the result of a six-months' application of principles which I had, after anxious study, myself determined. This is my apology for now offering these notes, suggested by Mr Miller's paper in the November number of this Journal.

To relate my own personal case would be to tell an oft-told tale. To point out wherein I differ from Mr Miller and other writers would be an uncongenial task. I prefer to set forth the guiding principles

1 Brit. Med. Journ., 1882–3.
2 Lancet, February 9, 1884, and September 25, 1886. Brit. Med. Journ., June 30, 1888.
which have, for many years, directed my treatment of flat-foot. These I have never before fully formulated.

(1.) The foot is supported not only in but also by the exercise of its functions. The muscles, which by action move, in action sustain the structure. In early life they also develop the form.

(2.) Ligaments are insufficient to resist tension when continuous or prolonged. On the other hand, intermittent tension promotes their strength.

(3.) Muscles, developed by action, tend to remain taut and firm when not in action, and so, by keeping up continuous pressure, modify the bony contours.

(4.) As failure of muscular support tends to deformity from yielding of ligaments, so a renewal of it, in specially active degree, will renew the form.

(5.) In good walking the heel is raised from the ground by the calf muscles and by the long flexors, acting, with the peronei and tibialis posticus, at the same time.

(6.) While the long flexor muscles press the toes against the ground, they tend to lift up the heads of the metatarsal bones (forming the anterior pillar of the arch), which thus dance, so to speak, on tight ropes. Injurious pressure against the ground is thus prevented, when the weight is borne by the anterior pillar only.

(7.) This same action relieves all strain on the ligaments beneath the tarsus while drawing the two pillars towards each other and throwing the arch upwards, just as tightening a bow-string increases the bending of the bow.

(8.) In flat-foot the indication is to promote this bow-string or tie-rod action by vigorously springing to tip-toe both as a special exercise and in walking. Avoidance of continuous strain on the ligaments, as in careless standing, is also indicated.

(9.) While frequent rising to tip-toe during any necessary standing is desirable, prolonged standing, even in the tip-toe position, is not desirable. In this latter case the muscles are wearied by continuous contraction, and the ligaments lose the benefit of intermittent tension. It is the act, the movement, of rising to tip-toe that is beneficial.

(10.) As in order to have free movement upwards the heel must first completely descend to the ground, heels to the boots should be avoided.

(11.) The mechanism of the foot is best adapted for a level surface. The sole of the foot, therefore, must not be thickened on the inner side, as sometimes advised.

(12.) As the free bending of the foot necessary for efficient function takes place only, or mainly, at the oblique line of the metatarso-phalangeal joints, a thick sole is altogether inadmissible.

(13.) The short flexor muscles, acting with the abductors and adductors, play an important part in holding down the proximal
phalanx of the first and the middle phalanx of each of the smaller toes, while the long flexors act on the terminal phalanges.

(14.) The principal object of the arch being, as I contend, to protect these sole muscles from pressure, steel springs, cork or other pads, which press against them are to be scrupulously avoided.

(15.) The great toe having its natural plane of movement obliquely downwards and inwards (away from the others), it is important that all interference with this lateral movement should be avoided, otherwise the action of its flexors may be suspended.

(16.) In such case the bow-string or tie-rod effect of the action of the long flexor on the tarsal arch is lost. In this regard I attach nearly as much importance to proper socks as to proper boots.

(17.) As the arch is most pronounced and best adapted to sustain weight, and as the muscles for raising the heel and pressing down the toes act best, when the toes are directed slightly inwards, the toes should never be turned outwards in standing or in walking.

(18.) Free movement of the feet being impossible when the body rests on their outer edges, standing or walking in that position is not to be permitted.

(19.) As muscles when tired tend to as little action as possible, and so to throw extra strain upon the ligaments, all fatigue is to be avoided.

(20.) Inspiration, straightening of the spine and knee, throwing of the arms upwards, and of the head backwards, are all of them movements instinctively associated with the act of rising to extreme tip-toe. All these tend to throw the body, as a whole, into good position. Therefore, any exercise or form of work which involves springing upwards with every inspiration, coming downwards with every expiration (such as wood-cutting), should be encouraged. All exercise or work which involves continuous effort (such as holding up weights) is to be avoided, especially if it involve the squatting position.

Thus, as I contend, good walking and many forms of work are not only compatible with the cure of flat-foot, but may be used as a direct influence to that end. They who walk well will never be flat-footed, and they who are flat-footed—I am not now speaking of cases of bony ankylosis in the deformed position—may, by walking well, be cured. I know what took place in my own foot, and I have seen cases which, as I have reason to believe, would have been the subjects of osteotomy had they fallen into the hands of more enterprising surgeons. I have seen those cases get perfectly well, and yet the patients have not left their occupations for a single day.

If it could be shown that muscular action is not necessary to maintain, nor potent to restore when destroyed, the flattened arch, then, as I should have to admit, all the physiology of the feet which I have laid down in my book, produced after many years of careful study, would be worthy only of contemptuous disregard.

1 The Human Foot. Churchill, 1889.
If, however, surgeons will disregard that which, in my view, is the true physiology of the feet, and treat flat-foot by propping it up with a pad or spring; and if others prefer to readjust it by cutting out a bone, as one too many, or by fixing that which should be a joint by destroying the joint surfaces; in such cases I can only say—let it not be called a cure.

John Hunter, speaking of cancer, said 1—"For what I call a cure is an alteration of the disposition and of the effect of that disposition, and not the destruction of the cancerous parts." If then, as a consequence of defective function, we have a deformity, and if, by vigorously renewing the function, we remove at once both the deformity and the disposition thereto, that is a cure indeed. Such result in cases of flat-foot I have, over and over again, had the satisfaction of seeing, when I knew that no remedial treatment had been used other than to restore the defective function by proceeding on the lines which I have endeavoured to indicate.

VI.—HEALTH IN HANDWRITING.

By Alexander Cargill, Edinburgh.

Perhaps no evidence is more unreliable than that of chirography when an attempt is made by its help to determine what is the moral or physical disposition of the penman. And yet, in spite of many obvious difficulties that must necessarily ever confront him, the expert in handwriting may undertake to define—and that simply by means of such data as supplied, for instance, by a few strokes of the pen—what that moral or physical disposition actually is, and what are its chief features and characteristics. For, though nothing probably is more at the command of a writer of even the most ordinary skill than that little, subtle instrument, the pen, yet the very ease and simplicity wherewith its master can make it do his bidding, tends almost automatically, in the evolution of his hand characteristics, to the certain unfolding and disclosure of his personal identity. Thus, one of the commonest rules for the expert's guidance—a rule which, of course, has its exceptions—provides that an individual of, say, strong muscular physique should write in a bold, heavy style of penmanship, while a person who has little or no muscular grit to boast of should exhibit a thin, weak, and featureless style that might be supposed to correspond to his physique. All caligraphy does not, of course, come under the application of this general principle; but in nine out of every ten instances of what may be termed the "educated" style of handwriting (as distinguished from "illiterate" handwriting, which usually has no features about it whatever), it is perfectly possible for an expert by its means to define with considerable precision the physical characteristics of the writers. Not only is it possible to do this, but even the age of the penmen may be ascertained within at least a given cycle.

1 Quoted by Sir Spencer Wells in his Morton Lecture.