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Fig. 11.—Normal skin taken from neighborhood of wart for com-
parrison.

to justify this conclusion. Nothing very definite thus far has
been brought out concerning their etiology. I, therefore,
wish to congratulate one of the youngest members of the sec-
tion in attempting to work out, in the laboratory and under
the direction of Dr. Wile, this excellent demonstration of the
subject which should be regarded as promising and deserving
of further and more conclusive study.

Dr. William C. MacCarty, Rochester, Minn.: I have been
very much interested in the doctor's experiments because I
am interested in the histogenesis of such organisms. Per-
haps you are familiar with the histogenesis of neoplasms and
with Smith's work. I have followed his work well, in fact,
I was with him up to a month ago. He isolated his organ-
ism by producing plant tumors. He carried on these experi-
ments in regard to the parasitic idea of the neoplasms and it
was with great difficulty that he worked this out. A year
or so ago he produced some similar neoplasms by chemical
means, and in plants he produced neoplasms by injuring
the water supply and the roots of the plants. I hope that Dr.
Kingery will not draw too positive conclusions. We are all
interested in this work. Experiments should be made from a
physical standpoint, as he has suggested. I wish to express
my appreciation as a pathologist of this experimental work
and hope that he will not only continue it but that others
will carry out the experiments.

Dr. Harry G. Irvine, Minneapolis: I wish to add my
appreciation of this contribution of Drs. Wile and Kingery
and also of Dr. Kingery's excellent presentation of the sub-
ject. It is a very valuable and excellent attempt at arriving
at the etiology of this very common disease. In some in-
stances the lesions began as ordinary warts and later
became verruca vulgaris. This is interesting because while
we have thought that they were more or less alike, we know
that one is affected by certain treatment and the other not
at all. I think this is especially interesting.

Dr. Upo J. Wile, Ann Arbor, Mich.: In answer to Dr.
MacCarty I may say that we knew of Dr. Smith's work and
with due allowance for his results, I do not think we have
overstated our case. The facts are these: Material from
warts passed through a Berkefeld filter produced lesions
which were clinically and pathologically identical with warts.
Warty growths undoubtedly can be produced by other organ-
isms; thus the tubercle bacillus and the gonococcus undoubt-
edly produce warty growths. We believe that common warts,
however, are produced by this filtrable virus. If a filtrable
virus can produce marked epithelial hypertrophy, may not
this have a bearing on the growth of epithelium in other
tumors, for example, malignant tumors? It is at least sug-
uggestive. As to the nature of the virus, we say it can not be
cultivated by ordinary methods, but nevertheless it may be
an ultramicroscopic organism. We feel that further investi-
gation will prove it to be such.

Dr. Lyle Kingery, Ann Arbor, Mich.: As Dr. Wile has
said, we were familiar with Dr. Smith's work. As for pro-
ducing tumors in plants, he was able to do it with ammonia
and copper salts. Whether there was anything mixed in
our material, such as small drops of blood, remains to be
shown. We hope to do more work on the subject.

A NEW ADHESIVE MATERIAL
FOR TRACTION
W. F. CUNNINGHAM, M.D.
NEW YORK

The fixed traction and traction suspension methods of
treating fractures have been so widely adopted, and with
such satisfactory results, that anything which might increase
their application is worthy of a few descriptive lines.

Of the available substances for adhesive traction,
Sinclair's glue is undoubtedly the most satisfactory.
At times, however, because of the variability of the
fish glue from which it is made, it lacks the necessary
adhesive force. It is irritating to certain skins; but this
may be due, partly, to faulty preparation or to applying it too hot. Salicylic acid has been used as a
preservative according to some of the formulas. This
should be avoided, as it increases desquamation; thym-
om is equally effective as a preservative. Frequently,
it is necessary to wait some time after it is applied
before traction can be made, and a relatively large area
of skin must be available for its application.

Fig. 1 (Experiment 1).—Traction, suspension apparatus for fracture
of femur with 30 pounds of traction applied.

Many of the foregoing disadvantages may be
avoided by the use of a solution of celluloid in acetone.
For several months past, experiments have been made
with a 5 to 10 per cent. solution of celluloid in acetone,
and we have found that this makes an excellent adhe-
sive material. Twenty-five applications of this solution
have been carefully observed, and it is believed that the scope of traction is increased by its use.

Through the kindness of the American Celluloid Company we secured a supply of celluloid scrap from which an excellent solution may be made. The first

Fig. 2 (Experiment 7).—Suspension of leg for fracture of metatarsus; 10 per cent. solution to dorsal and plantar surfaces of great toe only.

experimental work was done with celluloid combs, as it was impossible to obtain celluloid scrap in France.

Given a standard adhesive material, experiments should be conducted to determine the relation between the area of surface glued and the amount of traction that can be applied. The skin tolerance for maximum weight should be known. This will vary in different parts of the body, and probably indirectly with movability of the subcutaneous tissues.

PREPARATION

The required amount of celluloid scrap and acetone are placed in a dry, clean, wide-mouthed bottle and securely stoppered. The bottle is then shaken or agitated at intervals, and the solution is ready for use in from twenty-four to forty-eight hours. When properly made, it should be an almost clear, homogeneous, syrupy fluid. The experimental solution of combs was often lumpy and contained some acetone insoluble material.

Acetone is very volatile, so precautions should be taken to prevent evaporation. During the war when these experiments were carried out celluloid was difficult to obtain and acetone sold as high as 30 francs a liter; but the antiewar selling price of acetone, which is used in the aeroplane industry, was 35 cents a pound. One liter will make sufficient material for from thirty to forty applications.

MODE OF APPLICATION

In the experiments, no careful preparation of the skin was made. It should, however, be absolutely dry; and the preliminary use of a few cubic centimeters of acetone on the region to be employed may aid in this respect, but is not necessary. A layer of celluloid solution is rapidly applied by means of a small, stiff brush. The quantity should be sufficient to soak through the

strip on which traction is to be applied, and a thin coating should be applied externally to get out all the wrinkles and air bubbles. Canton flannel is the best material for strips, but a double layer of gauze or muslin that is neither too hard nor too finely woven may be used.

Iodin and also picric acid and alcohol should be avoided as far as possible on areas to which any type of adhesive is to be applied. Both these drugs increase exfoliation, and we well know the reaction of certain skins to the former. We believe, with Sinclair, that the part should not be shaved before adhesive material is applied, for the hairs, if abundant, increase the efficiency of the adhesive, like hair in plaster. If there is delay in putting on the strip, the skin should be recoated, for it dries out in a thin, flexible film in a minute or two. The application of a circular gauze bandage over cotton increases the effectiveness of adhesion and should be used. It is needless to state that the solution is combustible; therefore it should not be heated, and containers should be so labeled.

Flexible metal tubes can be used as containers, direct application being made from them. This type of dispensing could be utilized for emergency use, as this method has proved practicable, but it would add materially to the cost. Muslin strips have been impecuniated with the solution, with the hope that it might be used like adhesive plaster, acetone being added when applied; but this method has proved unsatisfactory.

REPORT OF EXPERIMENTS

Experiment 1 (Fig. 1).—An application of a 4.9 per cent. solution of celluloid combs was made to the leg (there was no fracture in this case). 3-inch muslin strips being used, applied over an area of 6 inches. Traction of 30 pounds was applied as soon as the leg could be put up in apparatus and timed just less than ten minutes. Because the patient was so uncomfortable, 10 pounds were removed at the expiration of six hours and 10 more after seven hours. Traction and

Fig. 3 (Experiment 9).—Traction, countertraction metacarpal splint. Adhesive applied to volar forearm and volar and dorsal aspects of fingers.

the strips, which were still holding securely, were removed after seventeen days. There was no irritation of the skin.

Experiment 2.—An application of a 10 per cent. solution of celluloid combs was made to the lower humeral region over an area of 2 by 3 inches, for a fracture of the lower end of the humerus. To this area, with the inclusion of the forearm, Sinclair’s glue had previously been applied and the skin was blistered. Immediate traction by the hand was secured and held firmly by a pin in the notches of a Jones splint. An anesthetic was necessary for reduction, so the strip was removed at the end of forty-eight hours. The greater part of the skin had blistered to the vascular layer, and when
removed, left multiple bleeding points. The traction was undoubtedly excessive for the skin tolerance.

EXPERIMENT 3.—An application of a solution of celluloid combs was made to the anterior two thirds of the plantar surface of the foot for dorsiflexion in traction suspension (fracture of femur). Sinclair's glue had slipped four times, the last time within forty-eight hours. The strip applied with celluloid pulled away spontaneously after thirty-eight days. The inner side of the muslin was covered by a layer of epidermis, but the skin beneath was without irritation.

EXPERIMENT 4.—An application of a 5 per cent. solution of celluloid combs was made to the lower femoral region over an area of 3 by 5 inches for a fracture of the upper one third of the femur. Fifteen pounds traction was immediately applied. One side pulled away after fourteen days, and from its appearance it was concluded that the application had been unsatisfactory. An area of desquamated skin about 1 inch square remained attached to the strip, which did not appear to be holding at other points. The skin was also desquamating from picric acid.

EXPERIMENT 5.—An application of a 10 per cent. solution of celluloid combs to the skin was made with a 5 per cent. solution to the overlying muslin strip, in the malleolar regions over an area of 3 by 6 inches, with a pressure bandage over the cotton for a fracture of the lower third of the tibia and fibula. There was a wound 2½ inches above the tip of the malleolus. The foot in this instance was edematous, and there was a pressure sore over the heel. Immediate traction was secured by the hand and held by a heavy rubber tube. The patient was evacuated after twenty-seven days with the strip still holding.

EXPERIMENT 6.—An application of a 5 per cent. solution of celluloid combs was made to the forearm over an area of 3 by 5 inches for a fracture of the humerus. A traction of 5.5 pounds was applied. One half of the area had been blistered by a previous application of Sinclair's glue. After seventeen days the strip was removed and it was found that the blister had healed beneath. The patient was put in a plaster.

EXPERIMENT 7 (Fig. 2).—An application of a 10 per cent. solution of celluloid combs was made to the dorsal and plantar surfaces of the great toe, distal to the metatarsophalangeal joint, for fracture—dislocation of the tarsometatarsal joint. Suspension of the leg by traction on the great toe, using a muslin strip 1 inch wide and a firm bandage, was secured. The leg was taken down at the end of three days to prepare for an operation. The skin was in excellent condition. About one half of the time the patient was so uncomfortable that the heel was partially supported by a pillow.

EXPERIMENT 8.—With a 6 per cent. solution of celluloid applied to the forearm over an area of 1½ by 6 inches, Canton flannel strips being used, sufficient pull was exerted, three minutes after application, to pull the patient with the hospital bed without casters several feet, and the strip was still holding.

EXPERIMENT 9 (Fig. 3).—In a compound fracture of the second, third and fourth metacarpals with extensive laceration, a composite molded plaster and aluminum splint were made fast to the forearm with a 6 per cent. solution. Traction was secured by strips fastened to the fingers and secured by rubber tubes to a frame. The patient was under observation for almost two months, and the splint was still intact.

The celluloid solution was applied with satisfactory results in numerous other cases of fracture of the femur and humerus. Since these cases presented no points of added interest, they need not be described.

SOLE PLATE TRACTION

The subject of sole plate traction has not such a field as it had before Nov. 11, 1918, but occasionally in civil life, in crushing injuries of the lower extremity or compound fractures with badly lacerated soft parts, the method of traction becomes a puzzle. There are cases when traction strips cannot be used, and cases when Steinmann pins, Besley tongs, or Finochietto bands cannot be used without the risk of opening up new foci for micro-organisms to lodge and thereby increase infection.

It was for just such cases that Sinclair devised the "skate." This mechanism was glued to the sole and strips for reinforcement were carried over the dorsum of the foot. In certain cases the skin of the dorsum of the foot is in such condition that strips cannot be applied.

At No. 1 General Hospital, B. E. F., we had many cases of this type, and used an accurately molded sole plate with a 10 per cent. celluloid solution. The plate (Fig. 4) is made as follows: A light plaster impression of the plantar surface of the foot is made of four or five layers of bandage over Canton flannel long enough to extend from just beyond the big toe to the attachment of the Achilles tendon. This is accurately molded by hand and held in position for half an hour by a snug bandage over cotton. This is removed and reinforced by an aluminum strip, which is secured to the impression by a plaster bandage to which are attached traction cords. These should be so placed that the line of pull will pass through the center of the internal mal-

Fig. 4.—Molded sole plate, traction bar in position.

Fig. 5.—Fracture of femur, laceration of leg; molded sole plate completed and mode of traction; breaking stress, 38 pounds.
No attempt has been made in any of these cases to demonstrate the effectiveness of external traction, for this seems to be an accepted fact; but an attempt has been made merely to show that celluloid solution is an adhesive which can be used when other materials fail.

CONCLUSIONS
1. From 5 to 10 per cent. celluloid in acetone makes an excellent adhesive material.
2. Its rapidly volatilizing quality permits of immediate traction.
3. In high concentration it can be used when only small areas of skin are available.
4. It is insoluble in water; hence, it is not affected by perspiration or climatic changes.
5. Solutions which are likely to increase desquamation should not be used prior to the application of adhesive material.
6. The natural process of exfoliation of the epidermis limits the effectiveness of one application to about three weeks; on the plantar surface of the foot, over four weeks.

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MACROCHEILIA *
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AND 
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Macrocheilia, or enlargement of the lip, is essentially a hypertrophy or hyperplasia, involving chiefly the lymph vessels. It is therefore generally classed among the lymphangiomas. Very brief and very few are the statements found in textbooks on pathology concerning this abnormal condition of the lips, and little space is generally given it in clinical reports and in journalistic literature dealing with lymphangiomas. It is chiefly since Wegner's investigations on the subject that it has become customary to consider this condition as a lymphangioma or a lymphangiectasis. Sluys calls it a lymphangiomatosis. The blood vessels, however, may be as much involved as the lymph vessels. Occasionally, the blood vessels alone are abnormally developed. One of the most remarkable cases of

macrocheilia on record is one of a hemangiomatous macrocheilia, reported by Sonntag. It was associated with a hemangiomatous macroglossia. Cases have also been observed in which the proliferation involved chiefly the connective tissue. An entirely different and rare type of macrocheilia is represented by a few cases in which the enlargement was due to an abnormal development of the mucous glands of the lips. According to Fraenkel, they are either due to purely inflammatory processes, or are genuine, that is, congenital, abnormalities.

Macrocheilia is a purely clinical conception, as Eichler states, who defines the malformation as a persisting condition of a uniform swelling, equal in all dimensions. The lip appears twice, thrice and even six times as large as normal. The essential form is, in general, retained, but it is peculiarly clumsy and entirely out of proportion to the other parts of the face. The abnormality has been so marked in some cases that a mouth has been compared to a snout or a trunk. A circumscribed lymphangiomatous enlargement of the lip is therefore not to be called macrocheilia, nor does any temporary swelling resulting from inflammatory processes belong to this group of malformation. A few cases, however, have been observed in which a true macrocheilia, that is, a persisting uniform enlargement of the lip, developed as a sequel of recurrence of erysipelas.

DEVELOPMENT OF MACROCHEILIA

Macrocheilia is generally congenital; but it may also be acquired. The collective name of lymphangioma, applied to the condition to which this malformation is accredited, includes a large variety of forms, which are difficult to separate into well defined groups. But the congenital form of macrocheilia, together with several similar congenital lymph angiomatous or hemangiomatous hypertrophies of the face and neck, constitutes a fairly well characterized group, namely, that of the tongue (macroglossia), the cheek (macrocheilia), the skin (nevus lymphaticus) and the palate and the neck (hygroma colli et cervicis congenitum). In the congenital form, the malformation may be present at birth; in these cases the same disproportion of the size of the lip to the rest of the face remains as the child grows. Or there may be a mere suggestion of the malformation in the new-born child, and the disproportionate development occurs later. This is sometimes observed in association with recurrences of inflammatory processes, especially in erysipelas. Generally, the condition appears soon after birth or in

Fig. 1.—Appearance of patient before operation. 
Fig. 2.—Patient after operation.