INOCULATION, AUTOINOCULATION AND COMPLEMENT FIXATION TESTS IN POMPHOLYX
(TILBURY FOX) *

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In 1919, Darier¹ published an article on the vesicular and the vesicopustular eruptions on the hands and feet. In this article, he found mycelia, on microscopic examination, in the majority of those conditions corresponding to the classic description of pompholyx. His conclusions were that, after excluding eruptions of dermatitides due to plants, trauma, trades and the streptostaphylococci (dermatitis venenata; dermatitis traumatica; occupational dermatitis, and infectious eczematoid dermatitis), most cases of pompholyx (80 per cent.) were of mycotic nature.

The opinion expressed by Darier in 1919 created widespread interest. This opinion has not, however, been generally accepted up to the present time by independent observers, because of the general failure to demonstrate mold fungi in the typical lesions of pompholyx. As a matter of fact, Darier, in a most recent expression of opinion,² stated that he found parasitic mycelia in 80 per cent. of those cases presenting the clinical aspect of pompholyx. This latter opinion places the question in a totally different light; one in which many dermatologists concur.

Sabouraud,³ whose work with the ringworm fungi is well known, is of the opinion that pompholyx is not of mycotic origin, though there are pompholyx-like lesions that are; that labeling a disease as of mycotic origin because of the microscopic findings alone is insufficient, for the reason that occasional fragments of mycelium of the penicilium may be found living as saprophytes on the skin; thirdly, that cultures are necessary as additional evidence. In a previous communication,⁴ we amply confirmed Sabouraud's contentions that the higher fungi,

* From the Dermatological Research Institute.

1. Darier, J.: *Lancet* 2:578 (Sept. 27) 1919.

2. Darier, J.: *Presse méd.*, July, 1922, No. 52, p. 560.

3. Sabouraud: *Bull. Soc. franç. de dermat. et syph.*, 1921, No. 9, p. 441.

4. Greenbaum, S. S., and Klauder, J. V.: *Yeast Infections of the Skin*, *Arch. Dermat. & Syph.* 5:332-344 (March) 1922.

aside from the fission and the budding fungi, may be found on the normal skin, but that under certain conditions they may develop pathogenic properties.

Koch's laws are too well-known to necessitate description here, but they have not as yet been fulfilled in a way to place pompholyx definitely with the mycoses. Darier's studies were entirely microscopic and positive; Sabouraud's studies were both microscopic and cultural, but entirely negative. Sabouraud's studies have been confirmed, not only 'be me, but by many others. With the opinions of these two eminent dermatologists diametrically opposed, it was thought that perhaps the problem could be approached from other angles; namely, inoculation, autoinoculation and serologic studies.

The importance of having a clear understanding of the condition under discussion cannot be exaggerated, since all dermatologists are not in accord in considering pompholyx a clinical entity. As a matter of fact, it is not always easy to say that such and such a condition of the hands, feet or both is, for example, a trade dermatitis, a streptococcic dermatitis or a dermatitis venenata. All of us are well aware of the fact that more than one factor (bacterium, exotoxin, endotoxin) may lie behind the development of lesions clinically exactly alike. The reason for this is not far to seek, since we know that the skin can react to any irritant in but a few ways; whereas the number of irritants are far more numerous. If the important fact is recognized that clinical lesions with a varied etiology may not differ, it then becomes evident that other means besides clinical, bacteriologic and cultural measures are necessary to differentiate these etiologic factors.

TYPE OF CASE STUDIED

For the sake of clearness, a brief description of the type of case selected for this study follows:

True pompholyx (cheiropompholyx of Hutchinson, dyshidrosis of Tilbury Fox) is characterized by the development of vesicles and bullae on the hands and feet and, notably, the palms, lateral surfaces of the fingers and soles. This acute, generally symmetrical inflammatory disease is further characterized by the development of its manifestations in crops, its tendency to recur and, as regards a single attack, its limited duration. The vesicles, at first small and deep-seated, increase in size, may and often do become purulent, coalesce and later undergo resorption. As a rule, spontaneous rupture does not occur, but accidental rupture of the larger ones is usual. It is to be remembered that all grades of the affection occur, from a few superficial or deep lesions to those involving the entire palm, dorsum of hands and the soles. In order to be absolutely certain that we were dealing with the affection under consideration, only those cases

in which the diagnosis was certain, with well-marked lesions and a history of previous attacks, were included in this study. Abortive cases, such as those in which there were but a few vesicles on the lateral surfaces of the fingers, were not included. The cases selected for this study came from private practice, from the Polyclinic Hospital dispensary of Dr. Jay F. Schamberg and from my own dispensary at the Mount Sinai Hospital.

INOCULATION TESTS

The surfaces of vesicles with clear contents were swabbed with alcohol and punctured with a capillary pipet. Sufficient fluid for the tests was thus obtained, and kept in sterile test tubes. The greater vulnerability of children to ringworm infection was recognized and volunteers were consequently used for the experiments. In control experiments, volunteers whom I had previously inoculated with trichophytons and microsporons, from their own scalp lesions, and with cultures from the laboratory, generally developed ringworm of the parts inoculated (glabrous skin) within from seven to ten days. It might be here noted that this autoinoculation test in ringworm of the scalp is quite simple and of value not only as an aid to the diagnosis of tinea capitis, but also as a method of determining the presence or absence of cure. The diagnostic lesion is easily eradicated. The volunteers used for the experiments in this study (five in number) were inoculated with a mixture of fluids obtained from different cases of pompholyx and were kept under observation three weeks.

The tests were uniformly negative.

AUTOINOCULATION TESTS

All the patients used for the complement fixation tests underwent an autoinoculation test. The vesicles generally selected were those in which the contents had not become purulent. When this was not possible, purulent contents were used. The surface was swabbed with alcohol, the vesicle punctured with a sterile capillary pipet and the material thus obtained rubbed into a superficially scarified area on the skin, over the deltoid muscle and in the inguinal region, the site of predilection of the epidermophyton. All the tests, following a three-week period of observation, were negative.

COMPLEMENT FIXATION STUDIES⁵

Kolmer⁶ showed that, with a polyvalent antigen of *Microsporon audouinii*, complement fixation occurred in 78 per cent. of persons suffer-

5. The complement fixation tests were performed by Miss Anna Rule, following the new standardized technic of Dr. John A. Kolmer.

6. Kolmer, J. A., and Strickler, Albert: Complement Fixation in Parasitic Skin Diseases, J. A. M. A. **44**:800-804 (March 6) 1915.

ing with ringworm of the scalp and that the antigens, not only of the microspora but of an achorion as well, were specific in that they did not fix complement with the serums of syphilitic patients or patients suffering with scabies, acne vulgaris, eczema and impetigo. That study seems to indicate that in superficial ringworm infection there is a concomitant development of "ringworm reagin." It was felt, therefore, that if pompholyx is really of ringworm origin, the depth of the lesions would presumably be associated with the development of complement fixing bodies in the blood.

As a result of certain recent studies in the immunologic relationships of the ringworm fungi,⁷ it was determined that the fungi, in certain instances, were so closely related that an antigen of some of them was of sufficient value to determine the presence of ringworm reagin produced in rabbits by the injection of many of the others. In the complement fixation tests in this study (twenty subjects), several such antigens were used independently. The antigens used were made from cultures of *Tricophyton niveum-radians*, *Tricophyton violaceum* and *Achorion gypseum*. Complement remained unfixed in every case tested.

CONCLUSIONS

1. Pompholyx is a clinical entity whose cause remains unknown. When well defined, ringworm as the etiologic factor can be clinically excluded.

2. There are poorly defined or aborted cases of pompholyx whose differentiation from the pompholyx-like lesions of ringworm require microscopic and cultural examinations. Autoinoculation, as a diagnostic test, is of value, but great care in the collection of the material to be used is advised, as severe scarring from secondary coccic infection may occur.

3. There are pompholyx-like eruptions having a mycotic origin.

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7. Paper to appear shortly.