A series of experiments including controls has been briefly described showing very satisfactory results from the methods summarised above. With a few exceptions the subjects of the experiment were Malayan Chinese.

Dr. Ryrie sends a later note written on January 28th, 1938, in answer to questions regarding further progress of the cases, and the possibly depressing effect of very large doses of hydnocarpus esters:

The twenty cases on large doses of hydnocarpus oil have continued to do well and it is now nearly a year since treatment was inaugurated. I think, however, it would be well to qualify my results by pointing out that Chinese leprosy in Malaya is not necessarily representative. For example intradermal treatment here does not have the wide range of usefulness that is claimed for it elsewhere; in Chinese Malays it is usually effective in cases where there is any degree of cellular activity. Again leprosy among these Chinese appears to have eruptive propensities that are less common elsewhere. A treatment therefore which ameliorates the cases I have described may not necessarily have general application. Malays, however, appear to respond well in tuberculoid cases.

With regard to apparent improvement being due to deterioration and lessening of reactive power. I would suggest that the lesions may subside either for good or evil, just as a temperature may subside on recovery or on the break-down of resistance. The general condition of my cases on hydnocarpus oil leads me very definitely to the belief that the apparent improvement is real and beneficial. On the other hand we have other cases where paralysis and atrophy of cellular response obviously occur as a result of resistance break-down and are reactivated on general recovery. I myself am convinced, however, that the two processes are different.

The matter seems to me of very great importance. The greater part of the reputation of hydnocarpus derivatives is built on their effect on tuberculoid lesions. If the specific obliteration or recession of these lesions is harmful, then most workers are doing a considerable amount of damage, slowly with low doses and more quickly with high doses. Possibly my point of view is one-sided owing to the exhausting virulence of some of the tuberculoid cases here. I have ceased to regard tuberculoid leprosy as a manifestation of resistance but as a potentially dangerous sensitisation of the area involved—tissue-vindictiveness rather than tissue defence.

*On Leprosy in the Bible

H. P. Lie.

There is also a number of other circumstances which make it practically impossible to assume that the *zaraath* mentioned in the Bible can have been the present day leprosy. Thus in the description of *zaraath* it appears that this can change appearance in a very short space of time, such as one or two weeks. On the contrary, present day leprosy is

*Second part of an article reprinted with permission from Acta Dermato-Venereologica, Vol. XVIII, No. 4.
emphatically a chronic disease which changes very slowly. Even minor changes often take years and it may also remain inactive for years. The only acute attacks, but these distinguish themselves by a reddish
at times a highly red colour, at any rate among the white race, and are accompanied by severe leprous infiltrations of
the affected skin. These parts are, therefore, more or less elevated above the level of the surrounding skin. This is
exactly the opposite of what takes place in zaraath.

According to the biblical version of zaraath, it must be assumed in many cases to have been an easily curable disease.
A typical instance of this is that of Naaman (II. Kings, chapter 5, verse 14). Our present day leprosy would
certainly not be cured by bathing seven times in the River Jordan, as was the case with Naaman. It is unfortunate that
this history does not give any description of the disease, since it strikingly calls to mind the affection mentioned in
Leviticus, chapter 13, verse 6. In regard to the latter, there
is more or less general agreement that it concerned
That it really was scabies or a similar epidemic in the case
of Naaman is not disproved by the statement that the
prophet's servant, Gehazi, who received some garments
from Naaman, also contracted a disease which, according to
the Bible, was hereditary as punishment for disobedience.
According to what was stated in this narrative, it could not
be our present day leprosy. It must also be assumed that
Miriam's zaraath was cured since she was received into the
camp again (Numbers, chapter 12) after seven days of
isolation. This simple cure of zaraath is greatly in contrast
with the prognosis of our present day leprosy. Leprosy is
not altogether incurable, but it takes a very long time and
usually many years to cure the disease.

Apart from the references cited above, the occurrence of
zaraath in individuals is described in three other places,
namely in II. Kings, chapter 7, where four lepers lay at the
entrance of the gate of Samaria and went to the camp of the
Syrians. But no mention is made of any symptoms of the
disease and nothing appears in their history to throw light
on the actual nature of their disease. The case is somewhat
different with regard to the two instances of zaraath
mentioned in II. Kings, chapter 15, verse 5, and in II.
Chronicles, chapter 26, verses 16, 19, 20 and 21. It must be
assumed that both kings Azariah and Uzziah were afflicted
with a much more serious disease than for instance Miriam,
since both were obliged to spend their entire life in isolated
dwellings. In this instance we might perhaps consider actual
leprosy. It is unfortunate that no detailed descriptions are given of their disease. The fact that the disease suddenly broke out on Uzziah’s forehead while he “was wroth with the priests and censoreel their privileges in their presence,” is more apt to weaken than to strengthen this opinion.

The fact which throws the greatest doubt on the opinion that zaraath was the same as our present day leprosy is the biblical description of zaraath on garments of different cloth, on furs and on stones in the house wall (Leviticus, chapter 13, verse 47, etc., chapter 14, verse 34, etc.). Here, to be sure the colour is another than that on human beings, namely greenish or reddish, but otherwise it greatly resembles the latter. It is more deeply situated than the surrounding healthy parts and spreads in the same manner as that described in human beings, and the same observation and isolation regulations are in force. This disease on clothes, etc., must have been highly infectious and feared, since very strict measures regarding cleansing processes of the attacked articles, and in particular for the houses concerned, are set forth. It was further decreed that not only such articles should be cleansed, but also individuals who had been in the houses had to cleanse themselves. There can scarcely be any doubt but that this concerns some species of fungi.

If one turns to Talmud in the hopes of finding more information regarding zaraath, one is disappointed not to find any further clinical information regarding zaraath in the Bible and zaraath in the Talmud where the question of leprosy is treated in Mishna. Here we encounter the unexpected assumption that zaraath does not belong to nega (nega = contagion) and it is, therefore, not considered to be infectious. According to Mishna, however, bohereth, seeth and sappachath belong to nega. Bohereeth as well as seeth are white, but only the former is glistening like snow or the whitewash on the wall, while seeth is more dull white and not glistening. But in both instances there is a scaling variety and that is sappachath. This is not in agreement with the assumption that these words are similar to our present day leprosy, a thing we should be inclined to deduct in accordance with Leviticus, chapter 13, verse 2, if we assume that zaraath is our present day leprosy. Further, a red bohereth is also mentioned, and a great number of colours are set up varying between red and white. Thus one teacher sets up 72 different forms. This fact leads us quite "out of bounds" and beyond the medical apprehension of our present day. For this very reason it is readily under-
stood that it was decreed that such patients must only be examined when the light was favourable and fell favourably upon the body, and that no one-eyed person or priest with poor eye-sight was permitted to examine these individuals and express his opinion on the nature of the disease.

As far as zaraath otherwise is concerned, it must have been a dreaded disease as it attacked the surroundings with its emanations. Talmud mentions an old saying that a bad wife means zaraath for the husband and he shall leave her and be healed. It will be seen that Talmud’s version of zaraath is not so little different from that of the Bible. It does not support the assertion, however, that the zaraath spoken of in the Bible is our present day leprosy.

It has already been pointed out above that both the Septuagint and the Vulgate translate zaraath with lepra. But the Greek word ἔντη, derived from σκῆτος = scaling, is the term used for various less severe diseases presenting crusts and scale-formations which are totally different from our present day leprosy. The latter is generally spoken of as elephantiasis by Greek authors. This regrettable confusion has been further increased by the fact that Haly Abbas’s Latin translator STEPHENUS, has translated the Arabian baras also as lepra. This baras which is described by a number of Arabian writers is said to have two forms, one dark and one white. This latter form is considered as being the actual baras and identical with the Greek σκῆς and the zaraath of the Hebrews, but not with the Greek elephantiasis. But the confusion became complete when the Arab’s judam, juzam, aljuzam and desjuddan which are the equivalent of the Greek’s elephantiasis, were also translated as lepra by the Arab’s Latin translators with one exception, namely, the translator of Haly Abbas, who translated juzam as elepha. As a result of these erroneous translations we surely have one of the reasons for the confused views taken by many writers prior to DANIELSEN and BOECK, and also that the Hebrew’s zaraath has found its way into biblical translations and has been looked upon as our present day leprosy.

It must be admitted that several of those who have declared that they assume that the biblical zaraath is our present day leprosy, have had a private doubt as to the correctness of their assumption. But most individuals who occupied themselves with leprosy mentioned in the Bible have had no doubt that Job was a leper. A sufficient proof of this fact is that Morbus Hjohi was quite a general name for leprosy. Likewise all the pictures from the Middle Ages
which illustrate him, represent Job as a leper. This assumption has flourished up to this very day. Thus BABES, in his great work on leprosy from the beginning of this century, says: ‘Hjob ist jedenfalls ein Leprißner’. Some authors have disagreed with this opinion and in the course of time a great many opinions have been advanced as regards Job’s disease. Thus, it has been expressed that Job’s disease must have been syphilis on account of the nocturnal pains, for Job exclaims: ‘My bones are pierced in me in the night season’ (Chapter 30, verse 17). On account of the doubtful existence of syphilis in ancient times, one can, I presume, ignore this theory. EBERLEIN has been of the opinion that the disease was a boil in the throat, since Job says: ‘It bindeth me about as the collar of my coat’ (Chapter 30, verse 18). This seems but little reasonable since this diagnosis does not take into account a number of other symptoms and circumstances connected with the disease.

Again, others have advanced the theory that it may have been varicella, or even bubonic plague etc. MUNCH is of the opinion that Job’s disease must have been eczema on account of the persisting and severe itch. PREUS is more or less in MUNCH’s opinion and looks upon it as a general eczema. After a thorough analysis, B. EBBELL has arrived at the firm conviction that Job’s disease, which in Hebrew is called schelh, has been varicella. EBBELL’s view is very interesting and enticing, but despite this, I cannot share his opinion of the variolous nature of Job’s disease, particularly since he disregards the important characteristic feature of Job’s disease, namely the itch. Neither can I accept the view that Job’s disease was a case of leprosy. In the severe pains in the legs of which Job complained, some authors may perhaps have recognized the severe and painful neuralgiae which frequently occur in the extremities of lepers. It must be borne in mind, however, that such pains are most often met with in the maculo-anaesthetic patients, and rarely in purely nodular lepers. The extreme formation of sores from the crown of the head to the soles of the feet, which is emphasized in Job’s case, is not encountered in the uncomplicated maculo-anaesthetic case of leprosy. One may likewise state that the itch does not belong to any form of uncomplicated leprosy. The itch which these patients occasionally complain of is exceedingly slight and the cause of it can generally be explained by other reasons than leprosy. The formation of sores belong to the later and last stages of nodular leprosy, and many patients escape sores altogether. In the description of Job’s disease there
is made no mention of the formation of nodules. If, in accordance with Babes' supposition, we assume that Job was leprous, then it must be exceedingly hard, if not impossible, to believe that Job was cured. For Job became eventually cured and happy, and left a healthy and beautiful issue. We cannot take for granted that such a description should refer to a leper who, according to Babes, was so severely attacked by the disease in the throat that he suffered from difficulty in breathing. In lepers such difficulties in breathing arising from throat affection are caused by scarred strictures in the larynx. Ulcerations in lepers may, to be sure, be cured, but not these scarred strictures. Babes himself is quite aware of the fact that it is difficult to assume that Job was a leper on account of his cure. He evades this difficulty, however, by assuming that the cure was only relative, an assumption which seems to me quite unconvincing. That Job suffered from an exceedingly severe and troublesome itch must be accepted as fact, and he has, in order to get relief from his suffering "taken him a potsherd and scraped himself withall" (Chapter 2, verse 8). As far as can be gathered, this symptom has also been decisive for Munch and Preuss, since they have diagnosed the case as eczema. This assumption, however, seems to me inadequate to explain the description of the severity of the disease, neither the extensive formation of sores (Chapter 2, verse 7), nor the dark colour of the skin (Chapter 30, verse 30). It is still more difficult to assume that Job's disease has been eczema when one considers that schechin is enumerated among the plagues of Egypt. We shall return to this later. It is likewise out of the question that eczema could have become epidemic and attacked the greater part of the entire people. The thought has become more firmly fixed in my mind in the course of time that Job's disease has not been any of the aforementioned diseases, but scabies, and in particular the malignant form which goes under the name of scabies crustosa. Unfortunately, this is also mentioned as scabies oorvepgica, but quite without any reasonable cause since it is reported from most European countries and all parts of the world, except Australia. It was D. C. Danie1ssen who first verified and described it at 'naturforskermitet' (meeting of natural science investigators) at Christiania (Oslo) in 1844, where he demonstrated the curious crustations with enormous masses of sarcoptes scabei in the crusts, such as he had encountered them in a leper patient. The disease is also described in Danie1ssen and Boerck's
chief work 'On spokalskvel' in 1847, page 160. It is also pictured in the atlas of this great work. In regards to the description I shall merely cite a few clinical symptoms: "The peculiar thing is the large, horny, grey-brown crusts which, when they are knocked or torn off, leave behind an ulcerated skin surface which secretes a scanty, viscid matter, and shortly forms new crusts. The patient is constantly troubled with an insufferable itch over the entire body; he is never seen sitting still, but is constantly scratching himself, and his night's rest is greatly disturbed ". A more detailed description of the disease was published by Bonck in 1855, owing to a couple of new cases among non-lepers. According to Kriess not more than a total of 57 cases had been recorded up to 1928. It would certainly be quite erroneous to assume that this inconsiderable number presented the actual expression for the frequency of the disease. Neither is the clinical picture in all cases quite limited; the crust-formation can be more or less pronounced even in scabies crustosa.

It is known that scabies is most frequently complicated with eczema and occasionally with abscesses, furunculosis, or phlegmons. In such cases there may be greater or lesser crust-formation and the limit between these and the real scabies crustosa may become uncertain. The actual cause
of the pronounced crust-formation is as yet unknown. It appears most frequently among young, neglected and poor individuals. The cause of the malignant form must be sought in the host rather than in the parasite, and uncleanliness plays doubtlessly an important part in this respect. We must assume, therefore, that the malignant form of scabies occurred in ancient times as well as in modern times much more commonly than considered and that the ancient Hebrews formed no exception.

As far as the relation between leprosy and scabies is concerned, the latter has certainly been a very frequent companion of the former, and doubtless has at times assumed serious proportions. The first case described by Danielsen is not the sole proof of this. Throughout the literature on leprosy we encounter scabies and at times this disease assumed forms which rightly made it greatly feared. When leprosy was most prevalent in Norway it was rare to find a leper who was not also afflicted with scabies. Among these I have personally come across a typical case of scabies crustosa. The treatment of this case lasted an entire year although the crust-formation was less pronounced than in the case described by Danielsen. If we turn further to the Norwegian history on leprosy we find that Christen Heiberg described cases of leprosy in 1827 which prove that the malignant forms of scabies cannot have been a rarity. Heiberg describes three forms of leprosy: the nodular, the smooth (glabra) and the scaling (squama). The characteristic features of the latter form, according to Heiberg, are that it begins with a dryness and shrivelling of the skin on feet and hands, which spreads to the limbs and then particularly to the inside parts, and occasionally to the breast and abdomen. After some time there appears a ringworm-like rash on the limbs, and the skin becomes scaly. This rash may disappear to return later and becomes very unpleasant on account of the severe itch. The rash continues to spread and without disappearing it forms into broad grey-white crusts approximating an inch (3 cm) in thickness, with swelling of the lymph nodes in the armpits and groins. It is my opinion that this concerns the veritable scabies crustosa. The swelling of lymph nodes so commonly encountered in this form is obviously due to secondary infections. I have described such infections in a fatal case of scabies crustosa in a non-leper.

Writers in the 18th century, such as Hensler who observed one single case of leprosy and collected a great amount of literature on the subject, mentions one form of
rash as leprosy. This began with spots that shortly itched and produced scales which broke off. But the rash increased in extent and size and the scales became huge crusts which caused a burning feeling in the skin, and an insufferable itch. Pursuant to Hensler, some writers have called this complaint impetigo, others prurigo, but most of the writers have called it a dry ulcerating scabies (scabies sicca ulcerosa), which was very much feared during the Middle Ages on account of its malignant form. Hensler may have been partly correct in specifying it as a form of lepra, although not pure leprosy, owing to the fact that the affection was partly accompanied by reduced feeling in arms and legs. It is quite evident to me that it is scabies crustosa which most nearly answers the description of this disease. The crusts are partly described as pieces of bark (sarticas), and partly as round and hard formations with the addition of ostracon, testositas. The somewhat varied colour is described as dark by the majority of writers. The possibility of syphilitic eruption can presumably not be excluded in every case, but the insufferable itch must be looked upon as a proof of the presence of scabies. With regard to the diagnosis impetigo it must be mentioned that W. Boëck (1855) states in his description of scabies crustosa, as well as in his special work on leprosy (Om den spédeliske Sygdom) (1842), that eczema impetiginodes is very common among lepers with scabies. Of other 18th century writers I shall only mention Pleiöck who goes so far as to specify a special form of leprosy, lepra scabiosa, which commences with blisters, extensive itch and burning of the skin. The blisters turn later on into large grey-green crusts which cover the entire body and even the face. Other Middle Age writers have also associated scabies and itch with leprosy, such as Bernhard Gordon (Montpellier, 1308) and the aforementioned "author inominatus." Even such an early writer as Aëtius (ca. 100 A.D.) states in his excellent description of nodular leprosy, that itch may be present in connection with this disease.

Scabies has been so thoroughly discussed in order that it may be compared with Job’s disease and the symptoms present great similarity. It has already been stated that Job must have suffered from an insufferable itch and in order to convey an impression of the manner in which scabies crustosa may present great sores which cover the entire body, a photograph is inserted of a case of scabies crustosa in a non-leper which has previously been mentioned by the writer.

The patient in question was actually covered with sores and crusts from the soles of his feet and up to the crown.
of his head. In accordance with Job, chapter 2, verse 5, it must be assumed that in the case of Job crusts have formed on his skin, and the "worms" that he complains about in the skin can very well be explained by the burning and insufferable itch which accompany this form of scabies. When Job says in chapter 30, verse 30: "my skin is black upon me and my bones are burnt with heat", from this may be referred that the crusts in scabies crustosa often are dark and that the disease often begins with big, dry crusts on the feet (see W. Bouck's sketches). That Job's nights are a torture and that he is troubled with dreams seems to agree very well with the restless and sleepless nights sustained by scabies patients (chapter 7, verse 14). The fever that often accompanies the malignant forms of scabies will also be able to explain the severe pains that Job complains of (chapter 30, verse 27): "my bowels boiled, and rested not". It appears from chapter 30, verse 10 that they who were around him abhorred and fled from him: "they abhor me, they flee from me". This is quite reasonable since scabies crustosa is very contagious and the afflicted person is most gruesome in appearance. If Job's disease had been leprosy it is surprising that his friends would sit with him, since leprosy was considered an infectious disease in accordance with ancient statutes. It was for this reason that all lepers had to be isolated. The same must presumably have been the case in Job's disease, had it been variola.

We have already mentioned that the Hebrew word for Job's disease was schechin, with the addition of ra = malignant, and this may very well agree with scabies crustosa. The general scabies must have been widely known and not particularly feared. The malignant form, however, was altogether a different matter and greatly feared. The Septuagint translates schechin ra with ἁλεύς πορφυρός, but this does not give a hint in any special direction and we cannot find, at any rate in the literature, any such term designating true leprosy. Neither does the Vulgate, which translates schechin ra with ulcus pestisimum, give us any hint as to whether we can assume it to be leprosy. Its Latin translation conveys the meaning of a malignant sore-disease in general and says nothing about the special nature of this disease. The disease schechin is mentioned several times in the Bible. Thus, in Exodus, chapter 9, verses 8—11 it is employed for one of the plagues of Egypt. Aforementioned reports from the Middle Ages have made it clear that scabies can spread and be greatly feared, and just as the plague here mentioned appeared on cattle also, scabies
is very prevalent among animals and can be transmitted to man from them. There was a time when it was even believed that scabies crustosa was a form of scabies transmitted from wolves to man. Presumably this is not the case. However, it is not unlikely that scabies can be passed on to human beings by the horse. As a plague, scabies can of course be naturally classed with the plagues mentioned in Exodus, chapter 8, namely of frogs, lice, etc. In Deuteronomy, chapter 28, are set forth the punishments that shall befall the disobedient and among these is mentioned schechin (verses 35 and 37). It is interesting to note that in verse 27, schechin is spoken of in connection with itch, and in verse 35 it is stated that schechin shall appear on the knees and legs. It may be interesting to mention in this connection that the knees are one of the most profected places for scabies crustosa.

Schechin is mentioned also in II. Kings, chapter 20, verses 1—7 as being Hezekiah's disease. Judging from the description, treatment and the results thereof, we must presume that we are dealing with an abscess or furuncle. This fact neither disproves nor excludes that schechin is synonymous with scabies. It has already been mentioned that in scabies it is no rarity to encounter abscesses and similar affections caused by secondary infection, and these two diseases may, therefore, easily have been confounded at that time, as they surely have continued to be.

Schechin is also mentioned in Leviticus, chapter 13, verses 18, 19, 20 and 23, but in such a manner that there must exist some connection between that and zaraath, since schechin may develop into or change to zaraath. But in accordance with the same chapter, verse 2, the same may be the case with scabies. Their similarity in changing to zaraath, makes it very likely that schechin and scabies have been one and the same disease, if perhaps in some other form or degree. It will be recalled that malignant scabies is frequently encountered in lepers and that some writers have even drawn up the particular form lepra scabiosa. It will easily be understood, therefore, that a patient with scabies crustosa but without leprosy has been considered as a leper and consequently been classified in literature on leprosy, as was probably the case with Job. In regard to this assumption in connection with Job's disease, it should be remarked that the entire Book of Job mostly conveys the impression that it constitutes a religious composition rather than an objective description of actual facts. Under such circumstances it is not wholly improbable that the
conclusion in this matter, is scarce, wholly confused and some even completely unintelligible. Besides, much of it points in quite other directions than toward leprosy. Thus, if one attempts to find conclusive proofs in the Bible that leprosy has existed among the ancient Hebrews, one will search in vain.

In conclusion, I will avail myself of this opportunity of thanking the Reverend Pastor Herman Friis Laading, Bergen, Norway, for his valuable help and guidance with regard to the original biblical texts.

LITERATURE.