were felt by Gierke and his school to be just as authoritative, just as much fraught with sovereign power as the political machine. There is something here which is analogous to what Hsun Tze and the authors of the Classic of Rites saw in Li. It was above the law and the policeman, something which came from the past and by its embodiment of the national ethos, had sanction for the present. Where it was at work, individuals lost their harsh egotism and became socialized. They became free in a fellowship of willing co-operation. The authority here resided in the body and not in the head; and the body is conceived of not as a body of which the members vote all different ways and in which a majority can only represent a compromise and oppression of the minorities. Rather it is a body all the members of which feel a common tradition, subject themselves to a common discipline, and look to achieve a common well-being. The 禮 敬, the Classic of Rites, erred very much on the despotic side, and China is now paying the price for that error. But the question for modern democracies, China's included, is whether they can develop a 禮 敬, i.e., a training in spiritual tradition and the practice of symbolic and poetic act. This is one solution to the dire problems with which modern citizenship is faced. I would say that it is the answer par excellence, if only the spirit of high religion, individual and social, be brought to bear. That pregnant

THE ARIDITY OF NORTH CHINA

By RAYMOND T. MOYER

What is to be believed regarding present climatic trends in North China? Does the available evidence point to a slow spreading of an increasing dessication over its whole area? Is North China gradually drying up?

Some, whose writings have had a wide influence upon opinion on that subject, find reason to conclude that this is the case.

Best known of these writings are the articles of Mr. Sowerby which have appeared in past issues of The China Journal. In the advance of sand along the Ordos Desert, in the large number of famines of recent years, and in the lesser signs of aridity commonly to be observed, he finds indications that desert conditions are encroaching upon North China. It can be only a matter of time, he believes, before this area will be as barren and as fruitless as the unwatered portions of Central Asia now are (4, 25, 26, 27). Dr. Englaender, writing recently in the Journal of the North China Branch of the Royal Asiatic Society, develops the theory that man's habitation results, eventually, in the reduction of the regions he occupies to desert conditions, and shows that we are now witnessing such a situation in North China (6). Others, basing their opinions on changes believed to be occurring in Central Asia, on the disappearance of forests, and on the severe drought conditions now existing in regions which were once the centre of China's civilization, see reason to come to the same conclusion. Acceptance of this theory is to be found widely held, not

In co-operation with the Sino-Swedish Scientific Research Association, Taiyuanfu, Shanxi.
only in scientific treatments of it, but in conversation, and in popular articles on present day China. Yet, with the information at present at hand, no such conclusions seem warranted. A good deal remains still to be learned before the climatic history of North China through the past five thousand years will be known completely with accuracy. But none of the proposed evidences of such a trend, now commonly accepted, point with any certainty to its existence as a fact. And available historical evidence unites in an indication that conditions in North China have been, for not less than the past fifteen hundred years, pretty much as they are to-day.

Such, at least, are the conclusions arrived at by the writer after conversations with geologists, climatologists, and others having information on this subject, after an examination of all the literature found relating to it, and after first-hand observations made in more than two thousand miles of travelling through many parts of Shansi Province, and in Shensi.

PROGRESSIVE DESSICATION IN CENTRAL ASIA

Some believers in an increasing dessication in North China, in support of this belief, point first to changes toward greater aridity thought to be occurring in Central Asia. Well-known explorers have returned from these regions convinced that at some time since man’s occupation such changes have occurred there (12, 15, 16). One writing recently, however, finds evidence that in the Turfan Basin there has been no increase in aridity within the past 1,000 or 1,500 years; and he feels that the theory of present climatic changes in this depression should be regarded as open to some modification and amendment (22).

Whatever the facts, it should be open to question to what extent climatic changes there, need be followed by similar changes here; for there are in Central Asia many fundamental factors influencing rainfall supply which are essentially different from those controlling precipitation in North China.

Thus, in North China the rainfall is caused by typhoons, the summer monsoons, and lesser cyclonic disturbances which carry moisture that has been derived from the Pacific Ocean. This is distributed over the land surface according to factors of topography and local influences which determine where and when it shall be precipitated. Of these bearers of rainfall, the summer monsoon is the most important. Great summer droughts are due mainly to its failure to reach the ordinary northern limits (7, 9, 14).

But in Central Asia, the S.E. summer monsoon is credited only with bringing a rainfall of about 10 inches to the eastern fringe of Mongolia. Beyond that, the influence from the Pacific appears to be negligible. Within the basin itself, the rainfall is slight and erratic. The main water supply is that of the streams which flow from the mountains of Thibet and Tian Shan. And these in turn derive their moisture from the Indian Ocean (17: 285-295).

Accordingly, as regards climatic trends, it seems reasonable to make a distinction between these two regions, and to draw conclusions about the situation in North China upon evidences of its own.

PRESENT ARIDITY IN FORMER CENTRES OF CIVILIZATION

Among other evidences that have been submitted, one is the present serious aridity in regions which were once the centres of Chinese civilization. Southwestern Shansi, and Shensi, for so many times the scenes of ancient Capitals, are now comparatively unimportant, and subject to recurring famines of the most severe sort. The fact is conspicuous. By some, this is held to indicate that former dynasties thrived under a more beneficent climate, the slow changing of which has been to a significant degree responsible for the gradual decline of importance of the regions affected.

Obviously, many factors may conceivably have contributed to this decline. For the purposes of this paper, however, there is only one question of importance. That is, to what extent does the climatic situation in these regions, to-day, actually differ from that of the former periods?

And, while information at present available does not seem to allow of a definite answer to this question, two facts are, I believe, clear. In the first place, the areas once occupied by the early Capitals are to-day still of tremendous fertility, well peopled, and, except in the recurring years of drought, very productive. In the second place, these recurring years of drought and famine have been known since the earliest history, and have been serious since at least the Chou Dynasty.

Shensi, climatically, can be divided into three parts:
a northern mountainous and dry region occupying almost one-half of the total area; a southern region, also mountainous, but interspersed with several fertile valleys, and better watered by a moisture-supply coming in part from the Yangtze valley, occupying about one-third of the total area; and the central Hsianfu plain running from the east to the west borders of the province, and occupying about one-fifth of the total area. There is no evidence that a dense population ever occupied either of the mountain areas, particularly the dry loess region to the north, so frequently thought of as representing the Shensi of to-day. The ancient civilizations centred on the eastern end of the Hsianfu plain. And this to-day is still a region of tremendous fertility, and well peopled.

Its area, in total, is calculated to be 17,250 square miles. Its estimated population before the last famine was 5,500,000, or an average of 317 per square mile. This includes the more sparsely-settled regions towards the Kansu border. Its eastern section would average a good deal higher. Yields of wheat on a normal good year around Hsianfu now run between 24-30 bushels (tou) per acre. On irrigated land there is produced between 45-60 bushels (tou) per acre, figures which would be almost unbelievable to the writer had they not been verified time and again by both foreigners and Chinese, not only here but in the best parts of southern Shansi. In such years cotton and wheat are still exported from this region. Naturally, land of this sort looked good to early settlers probably accustomed to a country much less productive.

Further, it is equally clear that recurring years of drought and famine, which to-day interrupt these years of plenty, are not peculiar to the present time alone. They have been known there since the earliest occupation by man. One of the principal occurrences of the reign of the first Emperor of the Shang Dynasty (1766-1122 B.C.) as it has been handed down, was a great drought which lasted for seven years. In the Early Han Dynasty, more numerous records are to be found. During the reign of Emperor Kao Ti, 206-195 B.C., we read, "There was a great famine in Kuan Chung (Shensi) and one load of rice was worth 10,000 cash. The people ate one another. So the government ordered them to go to Szechuan to get provisions." Forty years later, in the time of Emperor Tsing Ti, 156-141 B.C., there is recorded this familiar complaint: "Recently harvests have been very
A little later, Emperor Wu Ti, 140-70 B.C.: “In the beginning, the people of Kuan Chung wandered to Ching Chow (Hupeh) amounting to more than 100,000 families. But now they hear that their native land is peaceful and quiet, all are anxious to come back. The government then encouraged farming and accumulated grain, and Kuan Chung became prosperous and contented” (18: 147-166).

The existence of drought conditions in these early days is indicated, also, by irrigation systems established since earliest times. Towards the end of the Chou Dynasty (1122-221 B.C.) there was constructed a system reported to have irrigated no less than 660,000 acres (21: 145). The following mention of it in the records indicates the beneficial results that were felt to have followed its construction: “And there were no bad years, and the state of China became rich and strong” (18: 147).

It is worthwhile to note, however, that the famines and droughts of the Early Han Dynasty, just referred to, existed in spite of this irrigation system, which, if reported correctly as to size, was considerably larger than any which exists to-day, and which alone should have been capable of supporting about 4,000,000 people. These facts, to the writer, are of some importance in forming a general idea of comparative climatic conditions of the two ages within this region. They are not considered as being enough to draw a careful comparison. But they are believed to be enough to make invalid any claim, without proof other than the mere present drought conditions and relative unimportance of these once important areas, affirms that climatic changes toward a greater aridity have been to a significant degree responsible.

Forest Disappearance as the Result of Increasing Aridity

Evidence is strong that throughout China there existed, within historic times, a vegetative covering far more extensive than that which exists at present. By
some, an increasing dessication is held partly responsible
for its present lack. Were the climate not drier than
formerly, they argue, many mountain regions, well re-
moved from the possibility of extensive human destruc-
tion, would have by this time again naturally reseeded
themselves.

Travelling over various portions of the mountains of
Shansi, however, has revealed information which shows
this argument to be poorly founded. Many instances
are found where, with proper conditions of soil and
protection, natural reseeding still can and does occur at
various altitudes. Bareness, where it exists, is either
the result of human destruction, or a soil condition, and
not the result of any change of climate.

Of the hills which because of soil conditions cannot
now support a forest growth, it is likely that some have
never maintained any extensive forest covering. Others,
certainly, have been reduced to this condition by erosion
following denudation of vegetation. This is a fact already
written about so frequently that little mention of it
needs to be made here. Lowdermilk, in Northwestern
Shansi, found slopes, in a surprisingly few years, eroded
free of humus and soils which it had taken centuries to
accumulate, and without which further forests are not
able to appear (19). Whether slopes now bare have
always been bare, or whether they have been reduced
recently to this condition by some such process as
described above, the fact is that soil conditions on such
slopes make a return of forest growth at the present time
simply impossible.

Then, when given proper conditions of soil and
protection, natural reseeding can and does still occur in
varying altitudes. Several such areas in West Shansi
are described by Lowdermilk (19). Similar observa-
tions are made by Clark and Sowerby in Northern
Shensi, and again in Eastern Kansu, where, when in the course
of a Mohammedan rebellion, the population was wiped
out, and the human factor eliminated, the hills had
completely recovered from the almost desert conditions
(4: 305). Most of these examples occur at an altitude
varying from 5,000-8,000 feet above sea level.

The same phenomenon can be observed at an altitude
of about 3,000 feet in the Mien Shan forests, Shansi.
These forests, growing on a soil derived from the
weathering of limestones, and protected by the temple
authorities, have developed an excellent stand of white
pines. The beautiful white trunks of older trees are
here and there shut off from view by the younger trees
of many sizes which are growing around their bases.
Clearly this patch is naturally reseeding itself.

Little ground is seen, therefore, for the assertion
that an increasing aridity is responsible for a failure of
forests to return on the North China mountains.

Forest destruction as the cause of an
increasing aridity

The disappearance of forests, however, is more
frequently held to be the cause, rather than the result
of an increasing aridity (4, 6, 25, 26, 27). This,
frequently, is considered as being behind the supposed
trend toward greater aridity.

This theory in one of its forms, and its application to
China, has been outlined by Lowdermilk (20). In
theory, forest destruction results in greater run-off
following rainfall. An increase of run-off, which quickly
finds its way back to the sea, decreases the evaporation
opportunity for that area. In areas where an appreci-
able amount of the moisture supply comes from evapora-
tion (including transpiration) from the region over
which the moisture-carrying winds pass, a reduction in
the amount evaporated must result in a corresponding
reduction in the amount precipitated in that region, and
more particularly in those regions to the leeward of the
prevailing winds. His experiments conducted in Shansi
show that run-off on denuded slopes was greater, by as
much as fifty-fold, than that from those which had no
vegetative covering. He concludes that the net result
of general denudation of the slopes has been to reduce
the evaporation opportunity and by just so much the
aggregate precipitation.

The actual effect of forest destruction on the
precipitation of any land area, however, is a matter still
unproven. It stands at the present time as a debated
question upon which there does not exist any complete
agreement between forestry and climatology experts.

Those believing that forest destruction does result
in a decrease of precipitation upon the areas affected, hold
to earlier experimental work largely of Central European
origin, and to theoretical considerations of the type as
outlined above (29). The position of those who doubt
it has been summed up by a former chief of the U.S.
Weather Bureau who, after many years of observation, comes to the following conclusions: "Precipitation controls forestation, but forestation has little or no effect upon precipitation. During the period of accurate observations, the amount of precipitation has not increased or decreased to any extent worthy of consideration. Any marked climatic changes that have taken place are of wide extent and not local, and are appreciable only when measured in geological periods, and evidence is strong that the cutting away of forests has had nothing to do with the creating or augmenting of droughts in any part of the world" (23).

This difference of opinion among authorities, and the lack of conclusive data, make impossible at the present time any final conclusions as to within what limits, if any, this theory can be held. A number of foresters will admit a certain amount of effect of the kind outlined by Lowdermilk; and it seems logically possible. On such grounds, there could be admitted a theoretical possibility that a decrease in precipitation has occurred at some time during China's history, particularly in certain areas most to the Northwest.

SAND ENCROACHMENT ALONG THE ORDOS DESERT

In support of the theory of progressive dessication, there has been described the destructive encroachment of sand upon cultivated land along the borders of the Ordos Desert. Full description of this process in the regions around Yulinfu, Shensi, has been given by Clark and Sowerby (4). Recent word from a Famine Relief Worker, and an old resident of Kansu, described its recent workings near Lanchow, Kansu (The Peking Leader, Oct. 22, 1930). The same thing is occurring in a small section of Northwest Shansi. There can be little doubt that sand is encroaching upon cultivated land along this border; and that it forms a serious menace to the districts being invaded. Unless checked by some barrier, a tremendous area of land must in time be laid waste. However, this cannot be considered as evidence of a general trend toward increasing aridity. For, whatever may be the cause of desert encroachment in other places, under conditions common in a North China winter, loose sand will move. The tragedy of the situation for those involved, lies in the fact that they have settled too close to a menace which under ordinary conditions is bound to move forward.

[Photo by Albert C. Hauske]
The type of sandstone and shale mountain on which it seems probable that no dense forest covering has existed within historic times.
Shansi Province,
With the setting in of the winter monsoon, strong northwest winds sweeping out of dry central Asia initiate a period of dryness. Soils and streams dry up, and dust storms are frequent. These winds sweeping across the desert in the direction of Kansu, Shensi and Shansi are apparently of a fierceness not known to those who live east of the mountains which separate this area from the sea-coast. They are described by Sven Hedin, who crossed the Ordos one year during January: "Almost every day without exception a storm raged out of the Northwest, and this combined with the great cold, froze us to the marrow. I do not mean these were gales in the ordinary acceptation of the term. I mean veritable hurricanes, which swept across the wide unprotected plains with almost irresistible violence. I frequently felt as though every moment I should be lifted out of my saddle, or as though the camel would be blown violently over" (13: 1251).

In addition, no barrier of strong natural vegetation checks the sand's advance. Travellers through the loess country, of which this is typical, know how barren and desolate-looking it is in winter. The cultivated slopes have been kept free of weeds, and crop-remains have been removed for fuel. Uncultivated slopes, likewise, have been ravaged for fuel and left largely bare, particularly on the sandstone and shale hills such as exist in North Shensi where not covered with loess. Gullies are masses of rounded boulders and gravel. Trees are scarce. The sand is swept onward unhindered. Given such conditions, the loose sands of the Ordos are bound to advance, and the cultivated fields, upon which they are gradually being deposited, suffer in consequence.

Nor can this lack of vegetation be said to follow as the result of increasing aridity; for the same phenomenon can be observed where the rainfall is 5-10 inches greater. The sand blown out of stream beds on to the surrounding cultivated land, so frequently to be observed in North China, is a result of exactly the same forces. In the middle of the Taiyuanfu plain, an insignificant tributary of the Fen River which is dry in the winter, has had its sand so blown about by the winter winds that by now there has been laid waste a strip of land two miles in width and a number of miles in length. Travellers on the Peking-Hankow Railway will notice the same thing above Chengtingfu, Hopei. The winter winds have heaped sand on the surrounding country, nearly burying...
one side of the city wall of a small city, Hsin Lo Hsien, which has happened to be in the path of the sand-carrying winds. The conditions that allow of such a thing are the same as those which exist along the Ordos: a dry winter; loose material carried along by the strong North-west Monsoon winds; and a surrounding land-surface largely bared of vegetative growth through the fuel-gathering habits of the Chinese farmers. No rainfall records are available for either Yulinfu or Lanchow. Taiyuanfu, with probably a higher rainfall, has an average annual precipitation of 351 mm. Shih Chia Chuang, 35 miles from Hsin Lo Hsien and with similar weather conditions, has an average annual precipitation of 548 mm. (10). Precipitation, therefore, cannot be said to be the controlling factor in removals of vegetation that allow of the movement of sand. And sand encroachment along the Ordos, therefore, cannot be considered as evidence that a greater aridity is settling over all of North China. Under ordinary winter conditions, even where the annual rainfall is as much as 10 inches greater, loose sand will move and involve in destruction all that lies in its path.

**Famine Records**

The scientific value of the use of famine records for a comparison of climates of different periods is open to question. Political and human factors have entered too much into their making. As Huntington points out, also, historic records of droughts and famines do not indicate that the climate was either drier or moister than that of the present time. They merely show that the climate was either drier or moister than the normal for that period. (16: 88). Further, the Chinese records we have available are obviously influenced by such factors as distance from the Capital, and coloured by hopes of those reporting that land taxes might be remitted. Accordingly, no serious attempt will be made to draw conclusions through a comparison of figures. Yet the records we have (3, 14) are valuable because one of them (14) contains notes of weather conditions, and the nature and extent of the suffering, which accompanied the more serious famines. These are further elucidated by similar notes compiled in another volume (18). And it is believed that in a comparison of this information in its total, some fairly accurate general estimation of comparative conditions can be arrived at.

The records, as translated, begin with the T'ang Dynasty (A.D. 618-907), and show years in which are mentioned droughts whether they be of wide or limited extent. Information available before the T'ang Dynasty is considered to be too incomplete to be included, though one source (18) includes an interesting record from the Northern Wei Dynasty (A.D. 477-534). For comparison with conditions of recent times, information of the same sort was gathered for the two Provinces of Shensi and Hopei (Chihli) from people who, either because of special connection with famine relief activities or through long residence in these regions, are believed qualified to give accurate information on this subject.  

The records for Hopei cover the last 23 years. Those for Shensi are for the past 58 years. Samples of the records for the various periods follow below.

**RECENT**

*For Shensi only*
- 1877-78 - Very severe. Cannibalism.
- 1890-91 - Moderate.
- 1900-01 - Very severe. $13,000,000 distributed by the Empress Dowager.

*For both Shensi and Chihli*
- 1907-08 - Chihli. Limited area near Tientsin.
- 1911-12 - Moderate. $80,000 distributed by Yuan Shih Kai.
- 1915 - Chihli. Local failures around Taimingfu.
- 1920-21 - Moderate in Shensi. Widespread and severe in Chihli. Relief by many agencies.
- 1929 - Chihli and Shensi.
- 1930 - Shensi. Probably most severe of recent years.

**NORTHERN WEI DYNASTY**

The record available (18: 213-222) covers the years A.D. 477-534. Events are not listed by years but by Emperors. The following are examples.

- Reign of Tai Ho—Chihli and Shansi. Lack of seasonal rains. Sprouts dried up. Relief work.
- Reign of Tsing Ming—Honan and Shantung. Dead ordered to be buried.
- Reign of Ming Ti—Drought and disaster.

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3 The information for Hopei Province has been kindly offered by Mr. Dwight Edwards, Y.M.C.A., Peking; Dr. J. H. Ingram, American Board Mission, Peking; and Mr. A. C. Cunningham, Presbyterian Mission, Tachingfu. That for Shensi Province has been collected by Mr. F. S. Russel, English Baptist Mission, Sianfu, Shensi.
In 57 years, there are reported 19 years of famine in which relief work is done or some special action of the government is taken.

**Tang Dynasty**

670—Shansi and Shensi. Very severe.
671—
675—
677—Chihli and Honan. Great drought of long duration.
678—
681—Shansi and Shensi. Two years of land tax remitted. Great flood in Chihli and one year's tax remitted.
682—Shensi. Great drought.

**Period of the Five Dynasties**

952—Great drought. No snowfall.
953—Great drought. Wells and rivers dried up.
954—Yellow River fordable on foot. Locusts.
960—
961—Honan.
962—Chihli and Honan. Great drought in Chihli.

This series is then followed by a long list of famines in Honan. Out of 68 years, famine is reported in 38, a fact undoubtedly contributed to by the great political disorder and military activity of this period.

**Yuan Dynasty**

1328—Chihli, Honan, Kiangsu and Shensi. Great drought and cannibalism in Shensi.
1331—Chihli, Honan and Shansi.
1332—Chihli, Honan, Hupeh and Shansi.
1333—Chekiang and Kiangsu.
1334—Chekiang and Kiangsi.
1336—Chekiang, Hupeh, Kiangsu, Kiangsi, Shensi. Great distress prevailed.
1340—Kuangtung.
1342—Chihli, Honan and Shansi. Great drought, Cannibalism.

This group is followed by one of the worst of all the record. In 20 years, cannibalism is reported three times, and famines are recorded in every year but two. In 150 years, cannibalism is reported 11 times and famines are reported in a total of 79 years (14).

In the actual number of years having droughts, the most reliable figures are likely those given for the Province in which the Capital was located. These are listed below for the years during which the Capital was in the North.

Remnants of what probably was once an extensive forest, covering the granite mountains of Western Shansi province.
THE ARIDITY OF NORTH CHINA

<table>
<thead>
<tr>
<th>Dynasty</th>
<th>Date</th>
<th>Province</th>
<th>Droughts per 100 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Wei</td>
<td>477-534</td>
<td>Honan</td>
<td>83.3</td>
</tr>
<tr>
<td>Tang</td>
<td>618-907</td>
<td>Shensi</td>
<td>8.3</td>
</tr>
<tr>
<td>Five Dynasties</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern Sung</td>
<td>908-1126</td>
<td>Honan</td>
<td>26.2</td>
</tr>
<tr>
<td>Yuan</td>
<td>1271-1367</td>
<td>Chihli</td>
<td>32.7</td>
</tr>
<tr>
<td>Ming</td>
<td>1368-1644</td>
<td>Chihli</td>
<td>5.8</td>
</tr>
<tr>
<td>Ching</td>
<td>1644-1900</td>
<td>Chihli</td>
<td>26.9</td>
</tr>
<tr>
<td>Recent Records</td>
<td>1877-1930</td>
<td>Shensi</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>1907-1980</td>
<td>Chihli</td>
<td>27.2</td>
</tr>
</tbody>
</table>

Of these figures, those of the Tang and of the Ming Dynasties show a great variation, due probably to incompleteness. Those for the remaining Dynasties show a remarkable uniformity.

To sum up, although such data is not of sufficient accuracy to draw fine distinctions between the climates of these different periods, all indications are that conditions on the average have not varied a great deal through the period of time which this represents. In general, drought conditions seem to have been about the same through the last 1,500 years.

CLIMATIC RECORDS IN SHANTUNG

A scientific attempt to find information regarding climate, through more accurate research into historical records, has been attempted by Father Gherzi of the Siccawei Observatory, Shanghai, assisted by Catholic Missionaries in Shantung. Their method was to gather from the records of large towns in this Province the history of two meteorological phenomena characteristic of North China climate which are in no way dependent upon human influence but which are still recorded in local annals, namely, typhoons and violent northerly gales. Records examined were not those prepared for the Emperor, but are those made in each of the leading towns along the coast for the local chief. Thus the political factor becomes also eliminated.

The typhoon record, with figures showing the total number and the average number per month for the various periods, is as follows:

<table>
<thead>
<tr>
<th>Month</th>
<th>A.D. 552-1549</th>
<th>A.D. 1600-1892</th>
<th>A.D. 1895-1918</th>
</tr>
</thead>
<tbody>
<tr>
<td>July</td>
<td>.05 (61)</td>
<td>.08 (24)</td>
<td>.16 (4)</td>
</tr>
<tr>
<td>August</td>
<td>.03 (37)</td>
<td>.08 (24)</td>
<td>.20 (6)</td>
</tr>
<tr>
<td>September</td>
<td>.02 (28)</td>
<td>.06 (11)</td>
<td>.04 (1)</td>
</tr>
<tr>
<td>October</td>
<td>.02 (28)</td>
<td>(0)</td>
<td>(0)</td>
</tr>
</tbody>
</table>
From these figures the workers conclude that in the past there seems to have been a slightly longer typhoon season extending from July to October. There seems also to have been a few more in modern than in ancient times; but this they do not insist upon, as some typhoons were recorded without date, and all the towns have not yet been examined. Aside from a possibly longer season for typhoons, they consider conditions in respect to typhoons to have been about the same as to-day.

The record of the Northwesterly gales they find difficult to use in exact comparison with records of to-day. In the absence of instruments, the cataloguing of a gale is likely to be so much influenced by the human equation as to make the record unreliable. They give, therefore, only their general impression, after perusing the numerous dates reporting such gales, that as concerns the gale distribution around Shantung ten centuries ago, everything has been more or less as it is to-day. They would perhaps admit a longer period for these winds, and consequently a longer cold period for the Province of Shantung than is the case to-day.

Should such be true, the summer monsoon season now would be longer than in the past and there should have been occurring in North China a slight trend toward greater precipitation.

SUMMARY OF CONCLUSIONS

Is, then, the North China climate gradually becoming more arid? The following is a summary of conclusions which it is believed may be held pending the contribution of further information which will give a more accurate picture of what the conditions have been, or a truer interpretation of what may be the climatic trends they represent.

On theoretical grounds, due to forest destruction, it seems likely that certain regions to the west, particularly in Shensi and Kansu, and possibly parts of Honan, Western Honan and Inner Mongolia, have at some time suffered a reduction in rainfall. For certain localized areas due to sand encroachment, to an effect from Central Asia where conditions overlap, or to revolutionary changes in run-off resulting from slope denudation, the effective precipitation, and in some cases probably the actual precipitation, has been still further reduced. Unfortunately, accompanying evidence for those regions likely to have been most affected does not exist, or has not been made generally available. Drought records and notes on climate that are available indicate that for Shensi, the Shanfu plain of Shensi, and regions to the East, little change has occurred since the fifth century of the Christian Era.

For a trend of climate toward greater aridity over the whole of North China, there is found no satisfactory evidence, either theoretical or actual.

What we know is that since the beginning of the Han Dynasty (206 B.C.-A.D. 196) the North China climate has been characterized by periods of sufficient rainfall, interspersed at intervals with interruptions in its supply, which have caused partial or complete crop failures. From the time since more complete records have been kept, we find these interruptions frequent and followed by serious consequences to the population of the areas involved. As has been the case through recent decades, these consequences have been made more serious by political disturbances. From the data at hand there is no way of telling accurately whether they have been more or less frequent than to-day; but the general impression conveyed is that for at least the last 1,500 years they have not been less frequent than now. This conclusion is supported by that more accurate information which is on record.

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