information on the climatology of Tropical Africa in its relation to
disease, elucidating the subject from his own experience as medical
officer on the staff of the Congo railway. He begins with a sketch of
the physical features and meteorology of the region in question, coming
afterwards to the consideration of diseases and the rules of hygiene
which should be followed. His views by no means coincide with those
of Dr. Sambon lately placed before our Society, for he speaks of the
intimate relations which exist between the climate and the special
diseases of Tropical Africa. He points out that the purity of the air
depends on such factors as the configuration of the soil, its geology,
vegetation, etc., in which respects the situation of Equatorial Africa
is markedly unfavourable, while certain maladies, such as heat apoplexy
and tropical anemia, are classed by him as distinctly climatic.

A useful contribution to the history of the opening up of Africa
is supplied by Dr. H. Dehérain,* who describes the conquest of the
Egyptian Sudan under Mehemet Ali. This is a chapter of African
history which is by no means widely known, and one which derives
a special interest from the present military operations in the same
region. There is an instructive chapter on Khartum, and the
advantages and disadvantages of its geographical position, while the
influence which Mehemet Ali's schemes had on subsequent events in
the Sudan is clearly traced. Lastly, M. Victor Deville has lately
published a concise sketch of the exploration and partition of Africa,†
written from a decidedly French standpoint, but apparently reliable
as to facts. He allows that the British, Germans, and Belgians have
secured a better position than the French as regards the agricultural
and commercial benefits to be derived from Africa, and impresses on
his countrymen the need of learning a lesson from their rivals.

THE OLD BEDS OF THE AMU-DARIA.‡

By P. KROPOTKIN.

WITHIN the last few years the Russian Geographical Society has published, besides
a number of papers, two important works on the lower course of the Amu and the
Transcaspian lowlands, namely, 'The Old Beds of the Amu-daria,' by Baron Kaulbars
(Izvestia, vol. xvii. p. 4); and 'The Transcaspian Lowlands,' by M. Obrucheff
(Memoirs, General Geography, 1890). A third work of equal importance, 'Dis-
cussion of the Question relative to the Old Course of the Amu-daria,' by A. M.
Konshin, is now added to the above.§ The three works, together with the

† 'Partage de l'Afrique. Exploration, Colonization, Etat Politique.' Paris:
Librairie Africaine et Coloniale (Andre). 1898.
‡ Map, p. 336.
§ 'Razsyanenie Voprosa o dvrenem tchenii Amu-darii,' separate issue from the
Memoirs, General Geography, vol. xxxiii., 1897, 256 pages, with several maps and
drawings: namely, a geological map of the Transcaspian lowlands, 66² miles to an
excellent articles of Prince Hédérots* and M. Lessar, give a pretty complete idea of
the present state of our knowledge of the matter, and while they do not yet entirely
settle the question, they settle it, at least, upon one important point, namely, the
extension of the Caspian sea eastwards, into the Transcaspian territory, within the
Post-Pliocene age. The matter has been mentioned more than once in the pages
of the Proceedings R.G.S. and the Geographical Journal; but it seems to me to
deserve mention once more.

Before the year 1883, it was generally believed that the river-like bed of the
Uzboi represents an old bed of the Amu-daria, which turned westwards and
south-westwards before reaching Lake Aral, and flowed into the Caspian sea.
It is still traced as such on many maps. Another "old bed" of the Amu, the
Ungus, was traced in a western direction, from Charjui across the Kara-kum desert;
and a third "old bed" was supposed to be seen along the line of Akhal-teke oases
which is now followed by the Transcaspian railway. A number of similar elongated
ravines, which had been discovered in the Kara-kum sands, were also described as
so many traces of the old beds of the great river. This is still the point of view
which is held by Kaulbars, who considers that the Amu ran first in a valley at the
foot of the Kopet-dagh, then was gradually deflected to the right, so as to flow
along the Ungus, and finally took its present course due north-westwards from
Charjui, sending, however, an arm to the west, at Pitnyak, which arm discharged
its waters through the Uzboi into the Caspian sea.

The investigations and surveys of the Amu-daria expedition threw the first
doubts upon this conception. While it was evident that a branch of the Amu
once reached the Sary-kamysh depression (situated in the latitude of 41°–42° N. to
the south-west-south of Lake Aral), it was found by no means certain that the
western part to the Uzboi (from Balla-ishem westwards) should ever have been a
river-bed. And when the mining engineer, A. Konshin, visited the same regions,
he expressed, in 1883, the idea that, instead of tracing old beds of the Amu as far as
the present eastern shores of the Caspian, we must look for a wide extension of the
Caspian sea into the Transcaspian depression. The discovery of shells, now living
in the Caspian, at a distance of about 100 miles inland, at altitudes of 140 to 280
feet above the present level of the Caspian, gave support to this hypothesis.
It met, however, at the outset, with considerable opposition; the generalizations
of Konshin were sharply criticized, and bitter polemics ensued between him and
even such an explorer as M. Obrucheff, who also denies the fluvial origin of parts
of the Ungus and the Uzboi, but differs from M. Konshin upon several other points.

The volume now issued by M. Konshin bears ample traces of these polemics,
but on the whole it contains a good summing up of the data upon which the hypo-
thesis of the eastward extension of the Caspian is now based.

In order to give an idea of the present state of the question, it will, perhaps, be
best to sum up (in M. Konshin's words) the opinions of the different explorers:—

"Glukhovsky and Svintssov," he writes, "have no doubts that the Uzboi for its full
length, from the present Amu down to the present shore of the Caspian, was the old
bed of the classical Oxus, and that there is no other old bed of the Amu in the Trans-
caspian territory.

inch; two maps of the Uzboi, according to the surveys of 1874 and 1884; a profile
of the land between Kizil-aryat and Balla-ishem; a map of the old sea-beaches of the
Caspian on the slopes of the Great Balkhan mountains; a plan of the Ungus; a map
of the different stages of retreat of the Caspian at different epochs, according to the
author's views, and a number of small plans and drawings.

* * *

x 2
"Hedroits, and especially Lessar, categorically maintain, on the contrary, that the Uzboi was not a direct continuation of any one of the Khiva beds of the Amu, but only discharged into the Caspian those waters of Lake Aral, which accumulated in the Sary-kamysh depression; at the same time, Hedroits believes that the Amu flowed along the Ungus, which supposition is not accepted by Lessar.

"Kaulbars and Annenkoff positively maintain that the Uzboi was the old bed of the Amu, and that not only those branches of the Amu which watered the Khiva oasis were discharged through it, but also that branch of the Amu which ran along the Ungus; the branch which ran from Charjui along the saline depressions (shors), now seen at the foot of the Kopet-dagh, also joined it in its western part.

"Obrucheff differs from all the above in admitting that the western part of the Uzboi, from Lake Topatian (situated due north of the Kazanjik railway station), was a Caspian gulf, while its eastern part was an old bed of the Amu; and he sees the head of the Uzboi in the modern salted lake Kapilar-kul. He maintains, also, that there was a time when the Amu ran through the western portion of the Kara-kums and covered this region with its delta-deposits.

"Bogdanovich differs from all other explorers in considering the western Uzboi as a mere ravine due to the action of rain.

"As to me, I categorically deny in my earliest reports—first, that there are any traces of the Amu beds in the Kara-kums; and I maintained, next, that the Oxus always ran in the same direction, towards Lake Aral, as it flows now; that only on reaching the Albughir chink (escarpment) of the Ust-Urt, it began to branch off west and east, discharging its waters partly into Lake Aral and partly into the Sary-kamysh lakes, but not into the Caspian; that the supposed oscillations of the Amu were limited to the Sary-kamysh cone of its delta-deposits; and, finally, that the western Uzboi was, in its lower parts, the shore of a gulf of the Caspian, and in its upper portion a channel of discharge of water from the Sary-kamysh into the Caspian sea."

As to the Ungus, Svitsoff, who has levelled part of it and has crossed the Kara-kum plateau at its western end, denies the fluvial origin of the Ungus, and he has in that the full support of Lessar. Kaulbars and Annenkoff see in the Ungus an old bed of the Amu, and they are supported by Obrucheff, who, however, finds that the part of the Ungus which he has visited near Shilkh, has rather the aspects of an old sea-beach. He believes, nevertheless, that in olden times the Amu watered the Aklal-teke oasis, and that its delta occupied what is now the Kara-kum Sands. And, finally, Hedroits sees in the Ungus the old Arax, but adds that if marine fossils be found in the Kara-kum Sands, he will abandon this view. As to M. Koschin, he considers the Ungus as a distinct sea-beach.

In order to best emphasize the difference of views relative to the lower Amu, it may be as well to give first Obrucheff’s development of Kaulbars’s hypothesis in Obrucheff’s own words:—

"There is reason to believe," Obrucheff wrote in his important work, ‘The Transcaspian Depression,’ “that in the sandy region between Merv and Charjui the Amu-daria ran not only in the Repetek valley (Repetek is the first railway station in the south-west of Charjui), but even 40 miles further westwards—that is, past Uch-aji (next railway station), where it received the Murghab. Thus, the eastern part of the Transcaspian depression, which was land when the lake Aral already existed, was watered by the Amu and its tributaries, the Murghab and the Tejen. The Amu ran at that time from Kelif, along the Kelif-Uzboi, through Uch-aji, and then it bent westward into the above-mentioned basin of the Aral-Caspian. The Murghab joined it at Uch-aji, and the Tejen a little above its mouth. When the Kara-kum basin began to contract, the lowering of its level for each 10 sajens (70 feet) resulted in laying dry, along the seashore, a strip of land from 35 to 30 miles wide, which was covered with dunes (marine), the latter holding back the water of the river and compelling it to divide into branches amongst the dunes. The shors (elongated saline depressions), which are seen on the
southern border of the Kara-kum sands, are traces of these branches, which grew in
length in proportion as the seashore retreated westwards. When the level of the Aral-
Caspian basin was lowered by about 200 feet, the Kara-kum marine basin had nearly
totally disappeared, and the Caspian sea was connected with the Aral-Sary-kamysh
basin by means of a narrow strait. The Amu must have entered that strait, because
one sees a series of shors on the way from Kizil-avrat to Igdy. When the sea-level
sank another 20 feet, the Caspian became separated from the Aral-Sary-kamysh basin,
and the Kara-kum strait became a gulf of the Caspian. When the level of the latter
sank further by 120 feet, the Kara-kum gulf was reduced to half its former size, and its
head was about the Perevalnyia station of the Transcaspian railway, and somewhat to
the east of Lake Topiathan (in about 55° 40′ E. long.). Here we also find a series of
shors, so that it would seem that three thousand years ago the Amu still crossed the
Transcaspian depression and entered the Balkhany (or Kara-kum) gulf of the Caspian.
Perhaps it sent off a branch near its junction with the Tejen, and this branch ran past
Shilkh and Lailiy; but whether it was so, it is difficult to decide. However, as it is
known that Khiva was founded 678 years before our era, and as Khiva could not exist
without the Amu," Obrucheff concludes "that 2600 years before now one branch, at
least, of the Amu must have run along its present bed, or a bed approximately similar
to it, and reached the Sary-kamysh. About that time the Uzboi may have also been
formed."

Although this hypothesis seems very probable at first sight, and would very
well conciliate the doubtless eastward extension of the Caspian with the words of
Herodotus, one must, however, recognize that under the present state of our know-
ledge of the Transcaspian region, it would be difficult to prove that things went in
this way in the basin of the lower Amu. M. Konshin's contention is, in fact, that
the Kara-kum sands are a purely marine formation—the bottom of a gulf of the
Caspian, which nearly reached the Amu about Charjui. There are, he maintains,
in this area no traces of fluvialite deposits, which might be considered as delta-
 deposits of the Amu. The Ungus is, in his opinion, the escarpment of a distinct
sea-beach, and the shors along the Kopet-dagh are mere elongated remains of a
retreating sea, having nowhere the appearance of a river-bed, and nowhere contain-
ing shells of fluvialite origin. On the contrary, the clays which fill up the lower
part of the Kara-kum (between the Ungus and the oases at the foot of the Kopet-
dagh) are exact counterparts of the clays which are seen in the western part of
the same depression, where they contain shells identical with those which are now
living in the Caspian sea. The surface of the Kara-kum Sands, which are all covered
with hillocks and elongated rows of hills, 150 to 200 feet high, consisting of dirty
yellow sand lying upon hard red clays, and intersected with deep salt-bearing
depressions (shors) and hard takyrs of salted clay, is certainly quite different from
the alluvial plains which one is accustomed to find in the deltas of mighty rivers.

As to the marine shells, M. Konshin has found, as is known, shells of Cardium,
Dreysena, Neritina, and Hydrobia—all living now in the Caspian sea—on a wide
area, from the seashore to the 56th degree E. long., and up the Uzboi as far as the Sary-
kamysh depression. They lie on the surface, and consequently have not been
covered by subsequent delta-deposits of the Amu. In the Balkhan mountains they
are found along distinct sea-beaches at altitudes of from 140 to 280 feet above the
present level at the Caspian—these altitudes proving that in Post-Pliocene times the
Caspian must have extended far inland over the Kara-kums. Moreover, the Ungus
represents, M. Konshin remarks, an admirable sea-beach escarpment, having a
length of 270 miles, and separating the Pliocene clays of the Kara-kum plateau
from the Post-Pliocene sands and clays of the lower-lying Kara-kum Sands.

As to the Uzboi, which had been represented by the first surveyors, in 1874, as a
river-bed, there is no doubt whatever at the present time, since it has been carefully
mapped, levelled, and explored in 1883, that it never could have been a river-bed. The bottom of the Sary-kamysh depression lies much deeper than the bed of the Uzboi at Igdy, and altogether the Uzboi consists of two distinct parts—the Sary-kamysh basin which contains Amu-daria and Aral shells, and the southern and western part which contains marine Caspian shells.

To sum up the question, it may thus be accepted as nearly certain that there was a time in the Post-Pliocene age, when a long gulf of the Caspian sea protruded eastwards, nearly as far as the longitude of Merv, covering the Kara-kum sands (but not the Kara-kum plateau, in the north of the Ungus. At the same time another branch of the same gulf protruded northwards, along the Uzboi, probably as far as the Sary-kamysh. And it was at the same period that a long gulf of the Caspian extended up the present valley of the Volga nearly as far, or maybe even further than Kazan. The question, however, remains, whether there was a time when the Amu entered this gulf, so as to join the Murghab. Probably though this supposition appears from the general configuration of the land, it has still to be proved by more detailed research.

The next question, which also can only be solved by further detailed exploration of the Kara-kum sands, is, whether the Amu continued to flow or to send a branch in a westerly direction when the Kara-kum gulf began to dry up. I will permit myself to remark that the mere presence of shors and barkhans does not prove the existence of such a bed, so long as the existence of true alluvial delta-deposits has not been ascertained.

And, finally, I would like to suggest another important question—whether the junction between the Caspian and the Aral was maintained only by way of the Uzboi and the Sary-kamysh depression? or, as appears to me very probable, there existed a northern connection between the two basins, either in an eastern direction from the Mortvy Kultuk gulf of the Caspian, along the yet imperfectly known chain of lakes which is marked on our maps, or somewhere in a south-eastern direction from the same gulf. An exploration of these chains of lakes seems to me quite urgent.

Only detailed exploration will give the necessary data for answering these important questions. In the meantime, we can only express our deep gratitude to the explorers of this interesting region, and especially to Prince Hedroits and M. Konshin who have made a serious step in the solution of the Amu-daria problem, by showing that its solution must be looked for, not only in changes of the bed of the river, but especially in an eastward extension of the Caspian sea itself.

THE MONTHLY RECORD.

EUROPE.

Language Boundaries in the Grisons and Ticino.—In the fifth number of Petermann’s Mitteilungen for the current year, Dr. M. C. Menghius discusses the present language boundaries in the east of Switzerland, and their variations, as shown by the censuses of 1860, 1870, 1880, and 1888. Three languages are there represented—the German, Italian, and Rhaeto-Romansh, the last-named, in its present extension, forming but a scanty remnant of a once more widely distributed tongue, which has for many years yielded before the inroads of the other two. At its widest extent, the Romansh occupied almost the whole region between the upper Rhone and the upper Drave, i.e. the greater part of the Roman province of Rhaetia; but even at the beginning of the middle ages its boundaries were undergoing contraction, especially in Tirol, where German colonies occupied points, important strategically
GEOLOGICAL MAP
OF THE
TRANSCASPIAN DEPRESSION
Constructed by
A. M. KONSHIN, MINING ENGINEER
1890
English Miles