genug noch zur Besiedlung vorhanden ist, dass aber viele überseeische Länder heute den Willen nicht besitzen, neue Kolonisten anzusetzen und dadurch den Lebensstandard bei sich selbst zu verschlechtern. Er wird aber andererseits und zwar gerade bei uns in Mittel- und West-Europa zwangsläufig verschlechtert durch "Unterwelternungen," die kaum als Einanderungen zu bezeichnen sind und oft auch in den Statistiken nicht voll erfasst werden. Ich denke da an die temporären Arbeiterzuwanderungen aus dem Osten und Südosten Europas, die z.B. in hohem Masse gegenwärtig das Besiedlungsproblem Frankreichs charakterisieren. Es handelt sich dabei um Massen, die grösser sind als die grössten Völkerwanderungen vergangener Zeiten.

Unter den physischen Grundlagen interessiert mich persönlich neben den von Kollegen Fawcett erörterten Fragen der trockenen und kalten Räume die Besiedelbarkeit der feuchten Tropen, die sehr grosse Gebiete der Erde ausmachen und bei ihrer potentiellen Fruchtbarkeit für Endergebnis stark ins Gewicht fallen. Aber der schlechte Gesundheitszustand dieser Länder, ihre zu grosse Feuchtigkeit und die doch auch hier stark variierende Bodengüte scheinen Schätzungen auf eine recht unsichere Basis zu stellen. Ich glaube, dass Pencks Zahlen für die inneren Tropen zu hoch gegriffen sind, dass hingegen in den äusseren Tropen mit ihrer einmaligen längerer Trockenheit schon in der nächsten Zukunft eine grössere Besiedlung erreicht werden kann. Leider fehlt mir für diese Gebiete die eigene Anschauung, die Sie sich hier in England leichter verschaffen können als das uns Deutschen heute möglich ist.

The President: All present will remember that in the original programme for this series of lectures we had indication of a paper from Professor Jean Brunhes. Alas, he died before our Centenary meeting, and we tender to his compatriots our very deep sympathy in the loss of a distinguished geographer.

I am sure we all wish to thank the distinguished speakers to whom we have listened this morning. We thank Professor Carr-Saunders, Professor Fawcett, Mr. Chinnery, and Professor Krebs very much indeed for contributing such valuable information to our proceedings, and also Mr. Eldon Rutter, Mr. Kanthack, and Professor Griffith Taylor for sending papers for inclusion, though they were not able to be present to read them.* I hope when all the papers are bound we shall find we have assembled some contribution of real value to the study of that very important question of the Habitability of the Globe.

THE HABITABILITY OF THE ARABIAN DESERT
ELDON RUTTER

The Arabian Desert is a waste of naked yellow plains, composed of limestone, gravel flats, or shifting sand, among which are certain volcanic tracts covered with the black debris of lava and basalt. The horizons of this great wilderness are as unbroken as the horizons of the open sea. Like them,

*Professor Griffith Taylor's paper required such extensive illustration that we were not able to include it in the present number.—Ed. G.J.
they are pierced by infrequent pinnacles of rock. These stand up like huge bared fangs, symbolizing the eternal hunger which obtains in this sterile country.

In a very few places in Central and Northern Arabia, and also in the highlands of the South, small springs of running water issue from the rock. Wherever a spring occurs, an oasis and a human settlement is found. The springs eventually lose themselves in the palm-groves of the oases, or in the desert beyond. In the whole country there is not a single river or stream which reaches the sea, if we except the sudden torrents of rain-water which flow for a few hours or days during the rainy season.

In addition to the springs there are wells dotted about the desert at great distances apart. In some few spots, where a great subterranean store of water exists, a number of wells have been sunk in a small area. In such places oases have been formed, where the soil is suitable for cultivation. But for the most part the wells stand isolated and very far apart in the barren desert. They have been constructed at various times by the Badawi Arabs, who use them to water their herds of camels, and to get drinking-water for themselves.

There is another, though not a perennial, source of water-supply upon which the Arabs rely, namely, pools of rain-water, called, in the singular, khabra, plural, khabari. These form in wide shallow hollows in the limestone plain, especially in the steppe called El Hamad, in the Rualla territory in Northern Arabia. They may be found at any time between the beginning of November and the end of April, but not every khabra has water in it every year. It depends on whether rain does or does not happen to fall in the area which drains into the khabra.

Apart from the palm-groves and the fruit and vegetable gardens of the insignificant oases, what vegetation is to be found in this great sun-stricken wilderness? The only tree is a stunted thorny acacia which rarely becomes large enough to be accounted anything more than a bush. In the coastal plains, where the infiltration of water from the sea keeps the sub-soil moist, the tamarisk is occasionally met with. Grasses of various sorts, however, are found growing sparsely almost everywhere. Some of these resemble heather in form, but are of a grey-green colour. One variety, which springs up among the sand-dunes of the Nafud when the rains begin, is like meadow-grass. Some of the other varieties can best be compared to barbed wire.

The inhabitants of this desolate country, the Arabs, are divided into two classes—the townsmen or oasis-dwellers, and the Badawin or desert-dwellers. It is the latter class and their wildernesses with which we have to deal. The Badawin care very little for what we regard as comfort. It is so utterly impossible to make oneself comfortable in their terrible country that they have never made any attempt to cultivate ease. A sufficiency of water and pasturage for his camels, coarse tobacco, black coffee, and several young wives, unclean but sportive, with their hair well soaked in camel urine, would be luxuries enough for the most exacting Badawi. They have a saying that they are perfectly happy if they can find a place to camp in where there is plenty of water, pasture, and brushwood for fuel. But there is another thing without which the Badawi is never contented for long—namely, sport. Their national sport is known as el ghazu. It consists of making raids on hostile tribes for the purpose of stealing their flocks and herds.
The Badawi’s house is his hair-cloth tent. He pitches this wherever he comes across a patch of good pasturage. It is so made that he can open it into the wind or the sun, or close it against them. It is not such a good protection against the sun and rain as, say, an oak tree is. But it is a sheer luxury in that bare country of dire poverty, as any one who has ever crawled into one out of the burning sunlight will know. When the Badawi travels alone on some solitary errand he never takes a tent with him. He ties the leg of his camel and lies down to sleep under the stars.

To the Badawi the empty desert is as full of interest as the English countryside is to ourselves. He rides hither and thither in it all his life, searching among the hot stones for pasturage for his camels. He has a name for every mound and depression, for every dry watercourse and featureless plain, in the wide wilderness. As he rides, whether by day or by night, he is ever on the look-out for things of interest. Where the unaccustomed eyes of a stranger see only an empty plain, as lifeless as the sky overhead, the Badawi sees and studies, probably, an encampment of Arabs among some rocks 20 miles away, a flock of vultures tearing up the carcase of a camel, or a sand-coloured snake wriggling under a thorn-bush. He reads the ground as an European reads his newspaper. From the tracks he sees there, he knows whether the camels which passed that way were pack-camels or riding-camels, whether they were loaded or marching without burdens, what their pace was, whether they were grazing as they went, how long it is since they passed by, where they were going, and where they had come from. With the help of all this information, added to his general knowledge of desert politics and the movements of tribes, he knows to what tribe these camels belonged and, consequently, whether they were friends or foes.

It is on the upland plains of Northern and Central Arabia that the best camels are bred. Neither the soft fat beasts of the Nile Valley nor the tall giants of Sind are to be compared for general utility with the camels bred in the Arabian deserts. Constant wandering in the heat of summer and the cold winds of winter gives to the Arabian camel a degree of hardiness and power of endurance which is possessed by no other breed. In the spring, after the rains have fallen, young grass springs up everywhere. At this time the camels eat their fill day after day, and become fat, their humps rising nearly 2 feet above the spine. A camel in this condition will sell for £15 to £18 to the butchers in Egypt. The Egyptians consume a great deal of camel meat. The best riding-camels are sold to the army in Syria and Palestine, where they often fetch £20 or even more.

The tribes of Northern Arabia possess, besides camels, large flocks of goats and sheep. In the heat of summer these are left with shepherds near the oases on the borders of Syria and ‘Iraq, where the Badawin are sure of getting sufficient water for them. But soon after the rains have begun to fall the flocks are driven into the desert, where they live for four or five months on the spring pasturage. They are driven slowly from water to water, and learn to go without drinking for as long as four days in the cold weather. These sheep and goats are small, but they are excellent as food, and their short fleeces are used to line the skin coats which the Badawin wear in the frosty days and nights of winter.

The Northern tribes also breed a considerable number of horses. A Badawi
values his horse above everything else. If there is a shortage of water he will pour out a drink from the goat-skin water-bag, first for his horse, and then for himself and his family. Often they give their horses camel milk to drink. When they are travelling over a country where there is no pasture they feed the horses with barley which they carry with them, or if they have no barley, they will give them some of the dough which they prepare to make bread with.

When he goes out with a raiding-party the Badawi mounts into the saddle of his camel, while a son or other kinsman mounts behind him on the animal's croup. The horse is led by its long single rein of hair-rope. When they come up with the enemy the raiders get off their camels and mount their horses. The young boys are left in charge of the camels until they are summoned to reinforce the attacking party or the latter returns with the spoil.

The unproductive nature of the desert has caused the habits and daily life of the Badawin to remain the same as they have been probably for thousands of years. With the exception of firearms, Manchester cotton cloth, coffee, and tobacco, the Badawin possess nothing at this day which they did not possess before the time of Muhammad. Their tribal customs have not been seriously modified by Islam. In fact, by prowling along the roads leading to Mecca, and obstructing the pilgrim caravans, they have exposed themselves to the charge, which is frequently laid against them by the townsmen, of being enemies of Allah.

The Badawi can never remain long in the same place. His camels quickly eat up the sparse herbage, and then he must drive them to new grazing-grounds. Many of the grazing-grounds have no wells for hundreds of miles. Consequently they can only be made use of in the rainy season. Towards the end of October the Badawin begin anxiously to search the sky for rain-clouds. A few flashes of lightning will bring scouts riding over the barren plain from all directions to search for rain-pools.

The Arab's chief business in life is to breed camels. Even the indulgence of his favourite pastime, the raid, makes this a necessity. Now the camel is an unfortunate beast, for which nobody who does not intend to travel in barren countries has any use. Without his peculiar qualities of hardihood and the power to endure on short rations, the camel would be of less use in the desert than the horse. He must therefore be bred in circumstances of hardship in order that he may retain his distinctive qualities. The hard conditions of existence in Arabia suit the camel, and the coarse vegetation of the desert is its natural food. Camels fed on birsim may be fatter, but they never have anything like the same degree of strength and endurance as those fed on the rutha and hamdh of the desert.

As camel-breeders, then, the Badawin could not have a better country than that which they inhabit. As for the necessaries of life: their saddle-bags, bridles, sacks, ropes, and other gear are made by the women from the hair of their camels. When he wants coffee, flour, dates, or any other of the simple things needed in the desert, the Badawi sells a camel in an oasis and buys what he wants there with the proceeds. This is the Arabian Desert to-day, and such it has probably been since the days of Abraham.