

coals, as the temperature rises, the rate of absorption of oxygen increases. It is this chemical combination of the coal substance with the oxygen of the mine air which causes underground fires, and it follows that coal in a powdered or finely divided state, presenting a large air surface, is the most readily subject to heating. The scientific investigation of the phenomena surrounding the self-heating of coal has made rapid strides during the past ten years, and much credit is due to those responsible for the patient research work carried out at the various coal owners' research laboratories, chief amongst which is that of the Doncaster coal owners, established at Bentley Colliery in 1913, and lately removed to Birmingham University. A summary of the work accomplished was recently given in a paper read by the director, Dr. J. S. Haldane (Transactions of the Institution of Mining Engineers, vol. 53, pp. 194, etc.).

By accurate measurement of the relative absorption of oxygen by different coal seams it has been found that there is a very wide divergence in capacity. The Welsh anthracites and steam coals, for example, are found to have a small, definite capacity for oxygen which is not altered by increase of temperature, and these cannot, therefore, fire spontaneously. The same properties are found in most of the Durham coal seams, and it is well known that these two coal-fields are practically immune from spontaneous combustion of coal.

A very close study has also been made of the changes in the composition of mine air brought about by the self-heating of coal, with the result that by a system of analysis it is now possible to obtain an early indication of the presence of the self-heating of any coal seam. It will be apparent, therefore, from a practical point of view, that the fullest information should be available as to the chemical and physical phases of self-heating, in view of the changes that are constantly taking place in the conditions of mining coal. The working of the deeper seams, with conse-

quent increase of pressure due to superincumbent strata, as well as increased temperature, is bringing factors into play which will undoubtedly increase the tendency to spontaneous combustion. This is very noticeable in the case of the extension and development eastwards of the Midland coal-field in Yorkshire, where the Barnsley Bed Coal is being worked at increasing depths. The thickness of the seam varies from 8 ft. to 11 ft., and it is not practicable to extract the whole of the coal, owing to the danger arising from falls or roof. The depth of the seam varies from 600 to 900 yards, and the temperature of the workings is considerable. The result of these conditions is to render the seam liable to spontaneous combustion, contrary to what prevails in the extensive workings to the west, where the seam is shallower.

Various remedies have been suggested from time to time for dealing with the occurrence of spontaneous combustion. One well-known man of science has suggested that the oxygen content of the mine air should be reduced by mixing inert gases with the ventilating current, but such a course cannot be regarded as practicable. The application of hydraulic stowing has also been suggested, the principle being to replace the coal, contemporary with its extraction, by sand packing flushed into the workings from the surface, thus effectually filling up the wastes and excluding all air therefrom. Whilst this method of working has been utilised with success to a limited degree in Fifeshire, it is not economically possible of general adoption. One of the conclusions arrived at by the recent Departmental Committee on Spontaneous Combustion was that, generally speaking, the methods of working in vogue in the various districts where liability to spontaneous combustion exists are those best calculated to get the coal with the least danger of fire, and to give the greatest facilities for dealing with outbreaks. This expression of opinion is not only complimentary to the mining profession, but also satisfactory to members of the public interested in the safety of mines.

### Countries as Personalities.<sup>1</sup>

By PROF. H. J. FLEURE.

TO emphasise the State as the most important human grouping on the large scale leads us so far astray that even some serious students of social psychology try, with obvious ill-success, to discuss the psychology of whole nations like France, England, and Germany. The very inadequate justification is that a political group like a nation-State usually has one official language and tries to organise one educational system and thus endeavours to develop a common measure of social heritage and early experience to unify its population. As a matter of fact, unity of lan-

guage within a State is not so common as one imagines. Spain has Basque, Catalan, and Galician; France has Basque, Provençal, Breton, Flemish, German, besides her dialects related to Languedoc and Langue d'oïl. Germany has many dialects and also Wendish and Yiddish; Finland has Swedish and now also a Lapp element, and so on; while Switzerland has built successfully upon toleration of language diversity. This illustrates the diversity of biological units even within the most modern States, while the very noticeable trend in the treaties towards rearrangement of Central Europe on a language basis emphasises the fact that the biological unit has been uneasy

<sup>1</sup> Abridged from a citizens' lecture delivered at Edinburgh on September 12 during the meeting of the British Association.

under the political conditions of the centuries since the rise of the organised nation-State.

The fear of war between sovereign nation-States encourages schemes for reducing diversities within a State in the interests of that unity necessary for military efficiency and governmental discipline. If we were secure from fear of even European war our Irish problem would be transformed and reduced. The enforced administrative unity of France is admittedly a heavy burden imposed by military fears. The ideal of government is to allow scope for the expression of the social heritage of biological units, and it has become evident that the European system must be progressively modified to lessen the influences that inhibit that expression, as well as to promote toleration and understanding between diverse forms of that expression. We must therefore study biological social units to discover those which have special importance, as well as to emphasise the contributions they can make under improved conditions to the common stock of civilisation. It is unrestricted State-sovereignty and the armaments-fever thereby promoted that give rise to these dangerous inhibitions of biological units of mankind whereby civilisation is imperilled.

To ascertain what are effective biological units and what their characteristics and possibilities we need co-operation between anthropologists, historians, geographers, and economists at the very least, and anthropology must be broadly defined to include physiology and psychology too. The development of this co-operation is one of the most important tasks facing the branches of science dealing with man, and it is greatly to be hoped that it may break down artificial barriers such as those between the faculties of arts and of science in universities.

The geographer studies environmental conditions, past and present, and tries to follow the subtleties of the interaction on both sides between them and mankind. Russia, with its hundred millions of men of European stock, is too often crudely contrasted with the sixty millions of Germany and the thirty-nine millions of Frenchmen, and so on without due regard to the diversity of mankind. On the Russian plain for months in the winter the temperatures are too extreme nearly everywhere for the maintenance of mental efficiency among the generality of the people. People thus cut off from effective criticism for a part of the year must rely on routine, and a traditional rule of life will suit them best. These difficulties of life on the Russian plain are well brought out by Tolstoi in "Anna Karenina," but are too little considered in political arguments. Again, the long rainless periods in Russia, apparently the chief factor in limiting the beech tree to Europe west of the Pripet Marshes, imply hindrances to westernising agriculture there. The reactions differ in the various latitudinal zones of the pine forest, the oak forest, the forest and grass regions, the steppe and waste regions, and thus, by adding differentia, we

get to biological units within the inchoate mass of Russia, and it is these units that are the geographical personalities rather than Russia as a whole.

Studying orography in place of climate, we find the regions of high relief with deep valleys sharply cut off from one another giving rise to small units that preserve and accentuate differences of ancient origin. We find, too, that among them that process of linking man with the soil which has done so much to make Europe what it is has been delayed, and traces persist of seasonal movements up and down hill, of social organisation on a basis of kinship not yet superseded by that basis of neighbourhood on which modern European administration is built. The Scottish Highlands of the eighteenth century and Albania in the twentieth century may be quoted here.

Again, studying relations of position, we are led to see how remarkably communications affect geographical personality. Islands adjacent to larger land masses show different, frequently conflicting, developments of geographical personality within them, and these are related to differences of outlook towards adjacent shores. Guernsey has 37,000 people on 25 square miles and a uniquely intensive system of cultivation largely in the hands of families long settled in the island. Yet one can distinguish about three regional dialect differences, and there are also regional differences of family names and of physical type all of very old standing. "Lewis and Harris" in the Hebrides shows this remarkably, with dark, long heads in Harris, Nords near the Ness, and people with broad heads and dark colouring in the Barvas district. Anthropologists know that these differences are of very old standing indeed. Ireland is a tragic instance of diversity of outlook within an island, and Ceylon, Java, Madagascar, and many more also illustrate this point. Britain itself is less unified than the Paris Basin, and it may well be the hope of its citizens that its efforts for promoting "unity in diversity" may contribute very much to the solution of the problem of the world's peace—the provision of a world order which shall not create irritation by repression of biological units, thwarting geographical personality.

It is, however, not only environment that contributes to geographical personality; the work of man is so important in its cumulative effect that one can scarcely think of a real development of geographical personality without it. In Neolithic times the lowlands of Europe north of the Alps became forest-covered, where they were not too swampy, and the sparse population, ill-armed to cope with the forest, lived mainly on any patches kept open by looseness or dryness or special exposure of the surface. The forest was the dark abode of wild beasts that made the whole region unfriendly and full of obstacles to intercourse and growth of ideas. In the last phase of the Bronze age the cutting of forests seems to have begun seriously, and this period and the Early Iron age witnessed efforts to spread dominion over the

regions of the forest. Roads appear to have been made and villages built along the hillsides, and the heroic age tells of adventurers seeking fame and fortune by domination of territory dotted with these villages of deeply engrossed cultivators. The later organisation of power, especially in France, promoted the cutting of the forests, and market towns grew in what now became cornland, until, with the end of the Middle Ages, the growth of communication made the forest in many parts little more than a memory though still dominant in remote corners. The change of personality from the unfriendly forest full of wild beasts to the rich cornland dotted with villages focussing on market towns, is one of the most striking changes the earth has suffered since man spread over it. In the process is wrapped up more of the evolution of the nation-State and of our modern political-linguistic difficulties than we are apt to realise.

Healthy interrelations between geographical personalities are matters of urgent concern. There is special need to think of the remote corners, the Scottish highlands, the Welsh valleys, the Irish West, with conditions of hard effort for small return, and consequently with the export of men and women as a leading function. The value of this function is incalculable, for the great city eats up men and women soul and body, and until we have altered the basis of society our one hope of avoiding collapse is to have a stream of supply from the remote corners where treasures of ancient thought and inspiration survive and impart faculties especially of discernment and judgment. As Stevenson has it, "an honest old countryman has a sense of communion" with the powers of the universe, but he cannot vary from his faith unless he, "in a strict and not a conventional meaning," changes his mind. If the State does not yet provide education and health grants to the remote corners on a basis of area instead of a basis

of population, private effort is at least trying to show the way; city churches help mountain churches, and industrial magnates and their descendants are trying to help the people's effort to equip the youth who go out into the world, as well as, in Wales at least, to maintain the *genius loci*. Such helpful interactions will, however, not only stave off the collapse of our precarious civilisation; they may also keep the remote corner from hardening its activities into dead routine or falling into sheer eccentricity.

In the Midland Valley of Scotland, so open to the sea and the Continent, the inrush of new words ousted Celtic speech, though isolation from England allowed a good deal more of the heritage of Celtic place-names to be passed on than was the case in England, and also helped the Scots law to live, whereas, though the Welsh language persisted, Welsh law died largely for want of an administrative centre. The personality of the Central Lowland of Scotland is thus made very different from that of the rural Welsh valleys, and we see that we may consider geographical personality of many grades developed in regions of diverse size and character and owing much to the accumulated result of human work and intercourse through the ages.

The very large unit must include such wide diversities that, failing unusually strong links, the common measure of memory and feeling that furnishes the mainspring of social action may be low. The very small unit and the very isolated unit are apt to lose balance, when intellectual, and perhaps physical inbreeding over-emphasises certain heritages. The healthy mean will generally be found in units smaller than those of the great States of Europe, and this reflection is full of bearing on modern thought about social and political organisation of a world which has become one market for endlessly diverse products of spiritual as well as material kinds.

### Obituary.

WE regret to see announced in the *Chemical Age* the death on December 19 last, at the age of seventy-three years, of MR. HENRY ROWLATT AUGUSTUS OERTLING. Mr. Oertling was educated at University College, London, and as a young man entered the balance-making business founded by his father. For more than forty years he took an active interest in the management of the firm, and it was under his supervision and to his design that the short-beam Oertling balance was made. Other types of balance were also developed, and for many years balances suitable for educational purposes, as well as those necessary for scientific work requiring the highest accuracy, have been manufactured so successfully by the firm that the name of Messrs. L. Oertling, Ltd., is now well-known in scientific institutions throughout the world.

DR. JOHN HARLEY, who died at Beedings, Pulborough, on December 9 last, aged eighty-eight, NO. 2722, VOL. 108]

was born in Shropshire, where he studied the geology of the region round Ludlow. He specially investigated the microscopical structure of the skeletal fragments in the Ludlow bone-bed, and published an important paper on this subject in the *Quarterly Journal of the Geological Society* in 1861. During the following years, while physician at King's College Hospital, London, he contributed several notes on drugs to the *Pharmaceutical Journal*. He also wrote a memoir on the parasitism of the mistletoe, published by the Linnean Society in 1863. Dr. Harley bequeathed his geological collection to the Ludlow Museum.

WE notice with regret the announcement of the death on December 25, at the age of ninety, of DR. G. S. BRADY, F.R.S., hon. professor of natural history in the Armstrong College of the University of Durham, Newcastle.