neon, sulphur, chlorine and carbon have this advantage. Hydrogen and helium, which show strong permitted lines, must be very abundant. The metals are at a great disadvantage, but faint lines of several have been found. Allowing for the very different conditions of excitation, there is small evidence of composition differing from the stars.

The isolated atoms and molecules which absorb interstellar lines are all in the lowest component of their ground-states. Magnesium, silicon, and many other elements are thus removed from observation, and the spectra of the rest reduced to a very few observable lines. Sodium, potassium, calcium, titanium and iron have been detected, and the compounds CH and CN. The electron-abundance, found by comparison of Ca and Ca^+, shows that hydrogen, though not directly observable, is very abundant. In general, there appears to be a great similarity of composition, except for the solid bodies, which are just what might be expected in masses segregated by condensation.

BIOLOGY IN HUMAN RELATIONS*

By Mrs. S. Neville-Rolfe, O.B.E.
British Social Hygiene Council

VICTORY of arms will not remove the causes of war. These lie in the lack of ability, character and emotional development of man himself. If the forces he has created are to be readjusted and canalized to human service and welfare, it is urgent to fit man for the task. The recognition of this possibility and a concentration of effort in an endeavour to understand and improve the quality of man, both of to-day and to-morrow, intellectually, emotionally and physically, would give a re-birth to hope.

The attempt of the Economic Conference to reduce financial tensions by a planned money policy failed owing to the recognition that man has not attained a standard of integrity and trustworthiness requisite to success. Countless instances exist of man's inadequacy being the barrier to progress.

Since the beginning of the century, research workers of the universities, the experimental farms, the consulting rooms and the hospitals have added much factual knowledge to our store, but its application to man has been checked by its seeming conflict with traditional values and by the barriers of prejudice and unreasoning fears inherent in man himself. Biology is being applied to his material advantage in agriculture, in medicine and in food production, but hardly at all to man himself. Psychology has been discovering why man behaves as he does and disclosing the extent to which unrecognized and repressed emotions result in individual and group action entirely contrary to the dictates of intelligence. Physiology is explaining something of the interdependence of mind and body and the results of glandular disharmony on character. Anthropology and sociology demonstrate the dependence of the individual on the group and of the interaction between man and his environment. What we now need is a concerted endeavour to collate, interpret and apply these various discoveries.

Social biology rests on the factual contributions made by all sciences bearing on the development of man. Its task is to correlate and devise methods for their application, related to ethical principles, suited to the general pattern of each social structure.

A wide range of war and post-war problems awaits attention; to select but a few: migration and evacuation in relation to the family; nutrition and maternal mortality; miscegenation; family allowances; optimum marriage age; fertility, care and status of the unfit. The problems are legion. The present urgency is to democratize existing knowledge under responsible auspices.

An ignorant population is in danger—a prey to exploitation in the biological, as well as in the economic and political, fields. The harm can be irreparable when personality itself is injured. We see a terrifying example in the psychological conditioning of Nazi youth to cruelty and the harnessing of its emotional drive to the false values of national aggrandizement. In the biological field the same applies to the ease with which a distorted interpretation of eugenics has been imposed on a biologically ignorant population and used as a political weapon.

Even after two generations of education in Great Britain, the omission of social biology in school curricula has deprived science of an understanding public. Facts are discovered and published, but make little impression on individual practice, social behaviour or administration, as they relate to no emotionally accepted values.

Knowledge of nutrition, heredity and health is

* Substance of a paper read at the Conference on Science and World Order, on September 28.

available, yet bad feeding, unprotected defectives and irresponsible sex behaviour prevail. The evacuation disclosures of habits at direct variance with accepted standards of cleanliness, all demonstrate the futility of a system of education which ignores preparation for life in a living world. Such an omission is a serious handicap to a nation at war.

Measures should be taken forthwith to relate social biology to ethical values, and to apply present knowledge to current problems. This is admittedly incomplete, but each additional fact, each extension of our intellectual range and of our capacity to appreciate beauty in form, sound, colour and sense, each new harmony between intuition and science that illuminates truth, clarifies our spiritual vision. Social biology, drawing its facts from science, may be pictured using them as pieces of a jigsaw puzzle from which each generation must compose the ever-deepening and satisfying key-picture of what man is and can be. We must produce, on the basis of existing knowledge, a rough and tentative outline of that picture, now dimly perceived, of complete and developed man.

Of equal urgency is to promote a wider understanding and development of the whole man. Every educational system has concentrated on the training of intelligence, none has yet taken cognizance of the paramount influence of the emotional condition of man on his behaviour, or attempted to apply even our present knowledge of psychology. We are a world of emotional children with adult minds—babies playing ball with bombs.

A true democracy can only be created by the emotionally and intellectually developed, inspired with a positive purpose in life.

Emotion and intelligence, united in a common objective, obtain astounding results in thought, in action and in conduct, as exemplified by the ideal of the League of Nations, the Battle of Britain, the brotherhood of the bombed and homeless.

Unfortunately, even the groundwork of emotional understanding does not yet form a necessary part of the training of our leaders. Though some training in psychology is given to teachers, little emphasis is placed on the emotional aspect. Normal psychology and emotional development have no definite place in the training of the medical and allied services or in that of the judiciary.

Yet, how can a medical practitioner understand the whole personality of his ordinary patient when the only psychology he has studied is that of the abnormal? How can the midwife and the health visitor handle problems of family adjustment and emotional stress with no understanding of this side of her own or her patients' nature? How can the magistrate on the bench judge wisely actions arising from subconscious repressions when these to him appear irresponsible excuses?

We are adolescents who have grown out of our clothes. The manners and customs fitting the knowledge available in the past constrict development; the tight buttons of outworn prejudice and the belts and bands of repressed emotion seriously check healthy personal growth and racial progress.

That the younger generation welcomes information and guidance on matters of social biology is evidenced by more than a hundred thousand of the 16–25 age group who have attended *ad hoc* courses of lectures presenting a biological outline of how minds and bodies function, and encourage discussion on the related personal and social questions. These have been provided by progressive local authorities through the British Social Hygiene Council. Since 1934 the Educational Advisory Board of the Council has worked to promote the introduction of biology related to man into the educational system, and has made steady, if slow, progress, now gaining momentum through war conditions.

Up to date, local authorities have sponsored fifteen teachers' courses, and twenty teachers' conferences, and about thirty are now interested in, or considering, emergency programmes. It is a beginning in the effort to equip youth for personal and public life.

It is recognized already in military circles (though not always practised) that those trained and experienced in the War of 1914–18 are not the best improvisors of strategy and tactics for a war of dive-bombers and tanks. This principle applies even more strongly to questions which affect the development of man himself.

The emotionally immature, belonging to a previous generation, with a background of traditional dogma as religion, of *laisser-faire* as social economics, of philanthropic charity as good citizenship, and an idea of the 'equality of man' which ignores biological evidence, are not qualified to govern, or to lead youth in the present world crisis; yet it is they who are in control to-day. The old in experience and young in mind have ever been outstanding leaders, but the old in mind and years are unable to grasp the new problems or to relate new knowledge to spiritual values. They fear youth and from a mistaken sense of duty they continue to bear burdens beyond their years, and are barring advance. Hence the time-lag between the laboratory and the public is greatest in social biology.

It is vital to reach the younger generation in service and civil life, the parents of the future, and gain their intellectual interest and emotional drive behind the idea that man may control and

direct to the service of man the forces that he has set in motion.

To bring youth into world affairs, they must learn how to participate in the solution of daily problems. In science, in every firm and works, on committees of management, the Whitley Councils, staff and workers' conferences—let the under-twenty-fives be included to an adequate extent in each group represented and secure an equal proportion in each local government committee, social organization and voluntary body. Once the young see some hope of taking an effective share in the national effort, the service will not be lacking. The intelligence quotient reaches its adult level at about thirteen or fourteen. Experience is needed, but so are drive, a new outlook, and faith in man's destiny.

The claim of youth to the knowledge that could equip them for life, the demand for opportunity to enable them to grapple with those problems beyond the grasp of the old in mind, must be met soon, if the younger generation is to contribute effectively to the War and the post-war endeavour.

The present 'youth movement' was inspired from Germany; though misdirected in aim, its methods were effective in giving the Nazi leaders what they sought, because emotional and intellectual efforts were united, leadership was entrusted to youth, and its driving force was positive. The Scout and Guide movement, British in origin, also owed its success to its positive ideal and the leadership of youth. The present youth movement in Britain has not included the biological essentials. The control of the 'movement' is with few exceptions in the hands of older members of education committees, and of voluntary organizations established to meet older ideas and conditions. It is unrelated to reality and therefore unrelated to youth.

The young to-day have a deeper sense of spiritual values, but their positive philosophy must embody all truth as at present perceived. They are politically minded and see in personal freedom and impartial justice man's most precious possession, but of the present incomplete interpretation of the idea of Democracy, of Fascism, Nazism or Bolshevism, indeed of all existing systems, they tend to say "a plague on all your houses; we want something better!" Let them have the opportunity to create it.

PERCH IN BRITISH LAKES

A NEW FISHING INDUSTRY

By Dr. E. B. Worthington

Freshwater Biological Association, Wray Castle

IT is common knowledge that progressive changes in the physical conditions of an environment are paralleled by changes in the plant and animal communities inhabiting it. One of the first workers to elaborate the principle for the freshwater environment was Pearsall[1], who illustrated it with reference to the plant communities of the English lakes, but recognized that the animal communities were subject to corresponding changes. Thus, in the fish fauna of the English lakes there is a tendency for the original association of species, dominated by char (*Salvelinus willughbii*) and brown trout, to change into one dominated by perch and pike. Under natural conditions the change is very slow, being connected with the accumulation of silt and the general increase in productivity of water resulting therefrom; but in certain cases unconscious intervention from man appears to have accelerated the process. Thus for Windermere there is some documentary and much hearsay evidence that during the past fifty years the char and trout, which formerly gave rise to prosperous food and sporting fisheries, have been largely superseded by perch and pike, the change having probably been hastened by a general increase of productivity resulting from the addition of sewage.

From the fishery point of view the perch are recognized as a curse not only in Windermere but also in many other lakes in the district (see Watson[2]), because, as their numbers have increased they have become so dwarfed in average size as to be practically valueless to either the angler or the housewife. In order to save the fisheries, it seemed necessary to force evolution backwards, as it were, and thereby to cause the lake's fish biology to revert to the condition it was in, say, a century ago. The War has provided a use for these millions of small, unwanted fish. Their removal will, it is expected, benefit the post-war fishery, and at the same time initiate a large-scale ecological experiment which is likely to repay study for some years to come.

The perch of Windermere was first studied scientifically by Allen[3], who found that for most of its life the perch is a direct competitor with the