the lungs include oedema, haemorrhage, and hyaline membrane formation. If, however, the affected animals are removed from the highly oxygenated environment and are returned to air they may recover completely. Oxygen therapy is thus a subject to be approached with some caution. A team of experts should be available to monitor the oxygen content of alveolar air and of the arterial blood in order that dangerously high concentrations may be avoided. Safe administration of oxygen also requires the judgement of the clinician on whether an infant may not be returned to air, at least for a period, without too great a risk of tissue anoxia.

**Coal Gas and the Brain**

The common methods of attempting suicide in Britain are inhalation of carbon monoxide and ingestion of barbiturates and aspirin. Accidental exposure to coal gas adds to the number of cases of carbon monoxide poisoning, so that each year it rises to several thousand. The affinity of haemoglobin for carbon monoxide approaches 300 times that which it has for oxygen, and as nervous tissue is particularly and rapidly sensitive to oxygen lack, the major brunt of the toxic symptoms is borne by the central nervous system. In rapidly fatal cases of carbon monoxide poisoning the findings at necropsy are congestion and haemorrhages in all the organs, and these show the characteristic pink colour; but in less acutely fatal cases ischaemic changes, though seen, are less dramatic in other organs than are the anoxic and ischaemic lesions in the brain. Here there is necrosis in the second and third layers of the cortex and the superficial white matter, with degeneration of the Purkinje cells in the cerebellum and the cells of Sommers's sector of Ammon's horn. When death occurs later still there is extensive demyelination with gliosis and cerebral atrophy. Lesions may be found at all stages in the globus pallidus, and these are probably of vascular origin.

As the changes are widespread and diffuse, it is not surprising that the symptoms and sequelae of carbon monoxide intoxication cover almost the whole spectrum of cerebral dysfunction. What is surprising, however, is that patients who survive the acute stage only rarely suffer permanent effects. Death is common (20–40%), but if the patient lives recovery is usually complete. In a survey in New York State of over 21,100 cases of carbon monoxide poisoning only 39 patients were found to have permanent sequelae.

Early symptoms are also very varied. Euphoria, lack of judgement, headache, tightness across the forehead, and blurring of vision may all occur, progressing to confusion, disorientation, ataxia, drowsiness, and coma. Apart from the headache and visual symptoms the patient may be unaware of these features. If he is also unaware of the gas he may reach a state in which muscle anoxia prevents him from withdrawing from the danger even if consciousness is not lost early, as it will be if the patient is suddenly subjected to high concentrations. This is sometimes the fate of gallant would-be rescuers who have not paused to consider the possible cause of unconsciousness in a victim lying in an enclosed space.

**Treatment of Gonorrhoea**

In 1958 F. R. Curtis and A. E. Wilkinson reported that some strains of gonococci showed in-vitro evidence of becoming less sensitive to penicillin and that the reduction in sensitivity correlated with a higher clinical relapse rate. As a result of this and other similar reports most physicians increased the routine dose to at least 600,000 units of procaine penicillin or penicillin in aluminium monostearate (PAM). The latter had the disadvantage of a slow rise and fall in serum concentration, whereas Curtis and Wilkinson had pointed out that the ideal penicillin preparation for the cure of gonorrhoea should have a rapid rise, high plateau of 1.0 unit per ml. serum for 18–24 hours, and then a rapid fall in concentration. At about the same time P. Durel had reported clinical and laboratory evidence of an increasing percentage of streptomycin-resistant gonococci. Thus it was thought that reports of penicillin-resistant strains from individual clinics should be amplified by a wider
survey, and the Medical Research Council appointed an expert committee. In 1961 this committee published an interim report on an investigation covering nine centres throughout the country. It found that 262 (13%) of 1,984 strains of gonococci tested were less sensitive than usual to penicillin. A. J. Evans in 1962 and 1963 studied the clinical relapse rate of gonorrhoea. He found that when 600,000 units of procaine penicillin was given to 2,258 patients the relapse rate was 11%. He noted, however, that further treatment with a mixed penicillin (Triplepen) 2.5 mega units gave a cumulative failure rate of only 1.5%. He also reported that the relapse rate was as high as 19% when streptomycin 1.0 g. was given as routine treatment to 1,841 patients.

The increase in the incidence of gonorrhoea, together with the decrease in sensitivity of strains to penicillin, seems to have been world-wide, and therefore particular interest attaches to a report by D. D. Smith and J. M. Levey from Australia, where they found that 46 (44%) of 104 strains of gonococci isolated in 1966 showed decreased sensitivity to penicillin in vitro. Nine of these strains were resistant at a minimum inhibitory concentration of 0.1 unit of penicillin per ml., 27 at 0.5 unit per ml., 9 at 1.0 unit per ml., and 1 at 2.5 units per ml. C. R. Amies in Canada also noted an increasing resistance of gonococci to penicillin over eight years, and in Britain papers presented in March 1967 before the Medical Society for the Study of the Venereal Diseases, but not yet published, suggested that the proportion of partly resistant strains had also increased. Amies further noted that, if tetracycline was substituted for penicillin in the treatment of gonorrhoea, resistance to this antibiotic in vitro also developed, and he confirmed the observation of other workers that it was the same penicillin-resistant strains which were often also resistant to other antibiotics and chemotherapeutic drugs.

On the present evidence it seems we must accept that penicillin is still the most effective, least toxic, and cheapest drug in the cure of gonorrhoea, but it must be given in adequate dosage to prevent a further increase in the partial resistance of the gonococcus. A mixture of benzyl, procaine, and benzathine penicillins totalling 2.5 mega units given in a single intramuscular injection would seem a reasonable choice. Evans suggested the alternative of an injection of 2.4 mega units of penicillin with 0.5 g. probenecid with the injection, this repeated 6, 12, and 18 hours later, with a single injection of penicillinase 80,000 units at 24 hours. But, while fulfilling Curtis and Wilkinson's criterion of the "ideal serum plateau," this regimen presents difficulties in outpatient clinics.

There still remains the problem of the treatment of the penicillin-hypersensitive patient. Kanamycin in a single intramuscular injection of 2.0 g. has recently been shown to give only a 3.6% failure rate in 138 women with gonorrhoea and only a 3.0% failure rate in 102 men. In the latter study it was also shown that this dosage of kanamycin was not treponemicidal. If this drug was not so expensive it might be well suited for the routine treatment of gonorrhoea.

In the course of the last 20 years gonococci have evolved a survival technique against the repeated attacks of many different antibiotics, and at present the prevalence of gonorrhoea is rather high. The resurgence of the disease is mainly due to social factors, and the individual patient can still be cured with a suitable antibiotic, provided he avoids reinfec-

Survival in Arctic Waters

The recent loss of three fishing tugs has shown how vulnerable these vessels are in Arctic storms. The heavy loss of life has drawn attention to the perils which survivors must face under these conditions and puts in question the adequacy of current safety measures. In shipwreck men are at risk, firstly, with the actual sinking, which may happen quickly and take them down before they can escape. Then those who reach the water risk drowning and hypothermia. Those who are able to climb into boats or rafts or find other support are exposed to the continuing rigour of the storm and may soon suffer from exhaustion, exposure, seasickness, thirst, and demoralizing fear. A few may also have received physical injury.

With adequate facilities and good training the toll could be reduced. Years of experience, evidence from wartime sinkings, and continuing research have contributed greatly to increasing safety at sea. Most important advances include the inflatable life-jacket, the survival suit, and the inflatable life-raft. The ideal inflatable life-jacket is designed to support an unconscious man with his face clear of the water and should be secured with a thigh strap between the legs. In the Lakonia disaster in 1963 the fact that in 78% of cases post-mortem examination showed there was head injury points to the unsuitability of the life-jackets then used when it is necessary to jump into the sea from any height.

The period between leaving the ship and reaching a lifeboat or raft is critical. R. A. McCance and colleagues studied the fate of 27,000 merchant seamen lost at sea between 1940 and 1944. The overall mortality was 33%, of whom 80% died in the water. Even if adequate support is given by a life-jacket, a lightly clothed man could not expect to live more than 15 minutes in water at 0°C or 1 hr. at 5° C. Ordinary thick clothing will lengthen this period, and, as has been shown experimentally by W. R. Keatings, if this can be kept dry by wearing over it a simple plastic immersion suit many hours of survival can be expected. Interesting work by L. G. Pugh and O. G. Edholm has shown that a thin man in cold water will lose heat much more quickly if he attempts to swim than if he remains at rest—unlike the fat man, who has considerable natural thermal protection. Taking alcohol before entering the water greatly increases the risk of hypothermia.