

Mercury in edible fish

No medical man can be happy to learn that any item of human food contains methyl mercury compounds. The severe and distinctive toxic effects of methyl and ethyl mercury have been well described in our medical literature.^{1 2} And it was on medical advice the valuable methyl mercury seed dressings were excluded from Great Britain until an apparatus had been designed which ensured that in their application to seed grain there was no risk of human exposure.

However, the methyl mercury recently found to be present at levels around 0.5 parts per million in canned tuna fish is not of human manufacture. It appears that when mercury is present in a simple inorganic form in many biological environments it acts as a receptor for methyl groups from such compounds as cobalamin (vitamin B₁₂) secreted by micro-organisms. Thus methyl mercury, which is much more toxic to mammals than inorganic mercury, would appear to be a natural end product when mercury is added to many aquatic environments. The exceptional rise in the levels of methyl mercury in fish found in certain lakes in Sweden and North America has certainly resulted from the addition of mercury in various forms to the lake water as a direct result of human activity. An even more serious but similar situation was created in the Japanese estuaries of Minamata and Niigata by the outflow of industrial effluents rich in mercury.³

But it may be premature to conclude that all the methyl mercury in the oceans has arisen directly from human activity. Sea water contains many metals, and it is probable that the mercury naturally present at a concentration of 20 ng/litre may also be methylated by the lower organisms and in this form be picked up by fish such as the tuna. While the level of methyl mercury in fish taken from fresh or sea water not known to be contaminated ranges from 0.01 to 0.2 p.p.m., it may rise to as much as 5.0 p.p.m. in fish from contaminated lakes.⁴ There are no sound data on the levels of methyl mercury in the fish and shell fish that poisoned the residents on Minamata Bay. In fact at the present time the distribution and concentrations of methyl mercury in edible fish are very incompletely known.

The problem is that of deciding at what level in human food methyl mercury can be consumed without risk of harm to the consumer. Severe overexposure to methyl mercury compounds, such as occurred in some people occupationally exposed to the compounds¹ or after the ingestion of treated seed grain not intended for human consumption,² leads to unpleasant, largely irreversible lesions involving mainly sensory neurones in various parts of the nervous system. The irreversible nature of the lesions distinguishes them from the effects produced by mercury vapour. However, many people have undergone long-continued occupational exposure to low levels of methyl mercury without developing signs of neurological lesions, and / no means all the people in Japan who ate contaminated fish became ill. The recent work in Sweden leading to the discovery of certain fish in fresh-water lakes with levels of methyl mercury 10 times greater than in the canned tuna has disclosed no evidence of disease among people who eat a lot of the fish. Such people may have concentrations of methyl mercury ranging from 0.05 to 1.2 µg/g of red blood cells, compared with the levels of less than 0.005 µg/g in people who do not habitually eat fish.⁴

There is some evidence that blood levels of methyl mercury may accurately reflect the levels in the central nervous system.

Thus there is certainly an amount of methyl mercury which can be consumed regularly without producing damage. Methyl mercury is not totally cumulative, and studies on people with high blood levels from eating contaminated fish suggest that it has a half-life in man of about 70 days.⁵ Experts considering the problem of occupational exposure to methyl mercury have suggested that at least 100 µg may be absorbed daily without causing the blood level to rise to unacceptable heights. Such levels may still be associated with concentrations well below dangerous levels in the brain.

While it is certainly safe to eat ½ lb (220 g) of tuna containing 0.5 p.p.m. methyl mercury daily, there is at present little information on the magnitude of the margin of safety. Analysis of samples of total diet in Britain showed in 1969 that the level of mercury in all forms was at or below the level of detection (0.01 p.p.m.),⁶ which is reassuring for the general population. Meanwhile more work is needed to refine the methods of analysis in order to try to determine the exact chemical form in which the methyl mercury is present at these low levels in fish. The fish are unaffected, and it is possible that the methyl mercury is firmly and innocuously bound to some tissue constituent so long as the levels do not exceed a certain amount.

While never forgetting that methyl mercury compounds can be unpleasantly toxic if exposure to them is sufficiently severe, all the available evidence indicates that the traces found in the canned fish imported into this country provide no basis for the panic banning of their sale. Instead we should ally our efforts with those of our Scandinavian colleagues and try to learn more about the exact nature and origins of this new contamination of our environment. It is clear that no human action could immediately rid fresh waters or the oceans of methyl mercury. With the spread of industrialization to new countries special care will be needed to ensure that new closed-water systems are not polluted by mercury in effluents, particularly in areas where fish is virtually the sole source of first-class protein. Meanwhile the discovery that nature can convert inorganic mercury into a much more toxic molecule illustrates how much we still have to learn about the complex living environment in which we exist.

¹ Hunter, D., Bomford, R. R., and Russel, D. S., *Quarterly Journal of Medicine*, 1940, 33, 193.

² Jalili, M. A., and Abbasi, A. H., *British Journal of Industrial Medicine*, 1961, 18, 303.

³ Study Group of Minamata Disease, *Minamata Disease*. Kumamoto University, Japan, 1968 (in English).

⁴ *Nordisk Hygienisk Tidskrift*, 1970, Suppl. 3.

⁵ *Archives of Environmental Health*, 1969, 19, 891.

⁶ *Report of the Government Chemist*, 1969. London, H.M.S.O., 1970.

Industrial Relations Bill

The metamorphosis of the Government's rather vague consultative document on industrial relations¹ into the complex Bill² which is now before Parliament has unfortunately done little, at least as far as doctors are concerned, to resolve the uncertainty surrounding this legislation. Despite the craftsmanship of the parliamentary draughtsman the meanings of parts of the Bill are far from clear. This inevitably hampered the debate in the General Medical Services Committee and the Central Committee for Hospital Medical Services (see *Supplement*, p. 13) when they discussed the Bill.

The Council debated it after this issue of the *B.M.J.* had gone to press.

For doctors the parliamentary recess produced a number of confident—and possibly inspired—press forecasts about what the Government had in store for them. The B.M.A. had already been left in no doubt by the Department of Employment that doctors were to be included in the Bill. The question was how. Were they to be regarded as any other industrial or commercial worker or would they or their representative organizations be grouped separately with those of other professions in a special category? Total exclusion would probably be unacceptable to most doctors, particularly the younger ones, as it would seem to preclude any collective action on their behalf in the future.³ Certainly the B.M.A.'s two autonomous committees both decided not to oppose the Government's intention that doctors should be under the Act.

Inclusion of doctors means that the B.M.A. must register or risk losing its pre-eminent position as the profession's representative organization. However, inclusion even as a special category as now proposed by the Department of Employment (See *Supplement*, p. 14) would by no means resolve all the difficulties. The Department's proposal could nevertheless offer some comfort to those doctors who regard the idea of joining a trade union with abhorrence, for registration of the B.M.A. would be as an organization representing a group of professional workers and not as a union—a word which in any case would have a new meaning under the Act. The position of a hospital doctor as an employee within the meaning of the Act seems clear. Similarly there is no doubt about public health, university, or research doctors. In discussions the Department of Employment has stated that general practitioners are intended to be covered by the Act but the Bill as now worded apparently would not achieve this. The G.M.S. Committee in deciding not to seek exclusion for N.H.S. family doctors insists that inclusion must not in any way prejudice their independent contractor status.

Despite assurances from Mr. Robert Carr⁴ on the continuation of central negotiations for doctors and dentists, the method of resolving the anomaly whereby their employing authorities in the N.H.S. play no part in these kind of negotiations has not yet been defined. This is crucial, especially for general practitioners, and the Act must clearly do so. Only then could the profession's bargaining unit(s) in the N.H.S. be defined and all doctors in it properly protected. This might well necessitate the Health Departments as the effective employers of N.H.S. doctors accepting registration under the Act.

The Bill defines an industrial dispute as a dispute between employers (or their organizations) and workers (or their organizations). This definition is unlikely to cover a breakdown in negotiations between the profession and the Department of Health as presently conducted. Thus to meet the special position of doctors and dentists an extension of this definition will be necessary otherwise they could be unprotected in the event of future collective action.

A part of the Bill which might be to the profession's advantage concerns the legal enforceability of collective agreements. Clauses 32 and 33 make agreements reached by collective negotiation and awards of arbitration legally enforceable unless previously agreed otherwise. Doctors will need no reminder of recent occasions when a statutory requirement of this nature would have helped them.

The Government has made clear its intention to get this legislation through Parliament by the summer and 12 days have been allocated for the committee stage which, unusually,

will take place on the floor of the House. This timetable has made it necessary for the profession's representatives to enter into urgent discussions with the Government before having had an opportunity to consult doctors at large. However, the very confusion which has existed so far in interpreting the Bill would have made it difficult for the profession to debate the matter satisfactorily.

The Government's main attention will be on the industrial consequences of this Bill, but the fact that it had given little thought to the professions when drafting the legislation is no reason for disregarding them now. The Department of Employment's recent proposal could prove useful but its value will be greatly diminished unless the Government is prepared to accept further amendments, without which negotiations for doctors and dentists in the N.H.S. could be jeopardized.

The B.M.A. will be concentrating its immediate efforts to achieve terms which will protect doctors' interests. It is uncertain how much—if at all—the Association will need to alter its constitution in order to continue to represent the profession effectively. However, though the time available to press for appropriate amendments in the Bill is limited there seems to be no immediate urgency to consider changes in the Association's constitution solely to meet the new legislation as this is unlikely to be operating until mid-1972 at the earliest.

¹ Department of Employment and Productivity, *Industrial Relations Bill, Consultative Document*, London, H.M.S.O., 1970.

² See *British Medical Journal*, 1970, 4, 694.

³ *British Medical Journal*, 1970, 4, 507.

⁴ *British Medical Journal*, 1970, 4, 695.

Hospital Costing

Since April 1966, when a single costing system was introduced for all hospitals, the published returns have not shown the figures for individual hospitals. It has no longer been possible, therefore, to identify a particular hospital as being exceptionally costly—or the reverse. Instead one has to be content with inter-regional comparisons and with noting the difference between the costs of teaching hospitals and the national average for the regional boards. Thus, the national average cost of treating and caring for an inpatient for one week in 1969-70 was £55 14s. in England and £57 12s. 7d. in Wales.¹ The national average was 10½% higher than in the previous year.

Most of this increase directly reflected rises in pay and prices, but about 3% may be put down to improved services. However, the average figure obscures some quite large differences between the regions. Liverpool's cost per inpatient week, for instance, was only £49 1s. 3d., and Manchester's was the next lowest at £51 9s. 2d. At the other end Oxford showed the highest cost at £60 3s. 7d., closely followed by East Anglia with £59 13s. 10d. And higher up the costs league still come the teaching hospitals—£80 18s. 7d. in London and £72 5s. 4d. in the provinces.

Three-fifths of the weekly inpatient cost is accounted for by the treatment departments—that is, expenditure in the wards and operating theatres, and in the x-ray, pathology, radiotherapy, physiotherapy, and pharmacy departments. The largest single item of expenditure, about 60% of the total, is the pay of medical, nursing, domestic, and other staff in the wards. It follows that hospitals whose ward salary bills are higher than the average show a higher weekly inpatient cost. The Oxford region's cost per inpatient for nursing, for