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PULMONARY ASBESTOSIS

pneumoconioses or dust diseases, asbestosis would be the most serious from many points of view. ow a relatively short exposure—months instead s in silicosis—and while the morbidity rate, as l by radiological means, has been much re- measures to lessen the inhalation of asbestos factories, it can still be very high—44·5% s workers with 20 or more years' exposure and ose with 10 - 15 years' exposure.[1]

uction in frequency of pulmonary tuberculosis t-war era, and the equally striking increase in r in most countries, makes it difficult to assess ed liability of present-day sufferers from asbes- se two complications. Clearly the data obtained re years ago have little validity now, while carcinoma has such a range of frequency in ountries that conclusions based on world aver- rdly acceptable. In the case of pulmonary tuber- : British figure for the association of this disease cases of asbestosis in the years 1932 - 39 was ile in the same period the figure was 57·1% in f silicosis.[2] But in one part of Germany, recent findings published in 1960 show that is as a complication of silicosis was still very —34·6%—while the association with asbestosis %, little more than twice the tuberculosis figure ole population in that region.[3]

ng-cancer rate in silicosis is not appreciably n in the general population, but in asbestosis its is estimated to be about ten times that of simi- oups, both in Britain[4] and in Germany.[5]

it years the matter has been extended by the ptance by most pathologists of malignant meso- s an entity, and the even more tardy appreci- mesothelioma of the pleura may be associated stosis.[6-8]

pations where pneumoconiosis of mineral origin d, those affected are normally the miners and y the workers handling the material in bulk. there is no danger as a rule to those who deal anufactured goods containing the raw material . With asbestos it is otherwise. In Canada, where ee-quarters of the world's production of asbestos the miners would appear to suffer little as- d show no significantly increased cancer of the in South Africa at least, the miners, and even g in the vicinity of the mines, may develop as- d pleural mesothelioma.[7,9]

ses of asbestosis, however, result not from min- m employment in asbestos factories. Today sed in so many industries and is a constituent ny manufactured goods that the occupations stos is a potential hazard are too many to here. Workers at risk include such unlikely e garage worker employed in under-body car spraying,[10] and more obvious ones such as those employed in lagging pipes with asbestos, or those concerned with the manufacture of asbestos cement, roof and floor tiles, ceiling boards, etc., or with the use of them, such as builders and builders' labourers.

While the modern use of asbestos expands the field of potential inhalers of asbestos fibres, the risk of asbestosis is limited, and it is unlikely that these occupations will lead to a marked increase in pulmonary asbestosis. The effect of the inhalation of a small quantity of asbestos fibres, insufficient to produce pulmonary asbestosis, but possible in many of the occupations indicated, has been put on quite a different footing by two recent papers by Thomson and his colleagues in this *Journal*.[11,12] In the first paper[11] Thomson described 6 cases of mesothelioma, pleural and peritoneal, where there was no diffuse pulmonary asbestosis of the ordinary type, but only a few small foci of asbestosis at the bases of the lower lobes. It was stressed that this limited basal asbestosis produced no signs or symptoms and was likely to be overlooked at autopsy, unless sections from the lung bases were examined microscopically. In only one of these cases was there a history of exposure to asbestos.

This paper was followed by what appears to be the first investigation into the extent to which urban dwellers are exposed to the inhalation of asbestos fibres. Thomson *et al.*[12] examined the bases of lungs for asbestos bodies by a simple smear technique, and found that more than a quarter of the subjects over the age of 15 years in the autopsy services of the Groote Schuur Hospital, Cape Town, showed asbestos bodies, supporting their contention that the inhalation of asbestos fibres was now an urban hazard. They did not find that it was a significant hazard today, and were more concerned with what might happen in the future. They emphasized that the world's production of asbestos is increasing at a staggering rate, and is now eight times what it was 35 years ago, and that today asbestos-containing products are ubiquitous, especially in urban areas.

Thomson *et al.*[12] also drew attention to a simple but important fact which seems to have been overlooked so far from the medical and public health points of view. This is that the very reason for the use of asbestos in industry—its resistance to heat, acid, alkali, oxidation and reduction; in fact, its virtual indestructibility—is the reason why it may become progressively more dangerous to man. Wind and water may disperse asbestos fibres, but they cannot destroy them. Asbestos is now accumulating on the surface of the earth, mainly in the cities, at the rate of 2,400,000 long tons per annum; motor vehicles are discharging asbestos dust from brake drums, clutches, silencers and under-body coatings, and modern buildings may contain asbestos products from the roof to the basement. The indestructibility of asbestos makes this to some extent cumulative, and in effect we may be creating such

an asbestos environment in cities that in the future basal asbestosis may become almost universal in urban dwellers and mesothelioma of the pleura and peritoneum may become common tumours."

These observations and opinions are new and we await confirmation of these findings from other countries: they may well be confirmed as regards the frequency of asbestos bodies in the lungs of urban dwellers. It would seem a hard turn of fate that the avoidance of ordinary pulmonary asbestosis might lead to an increased frequency of mesothelioma of the pleura or peritoneum, presumably because the patient lives longer and the carcinogenic action of asbestos has a longer time to act. We hope the fears for the future expressed by Thomson *et al.*[12] are unjustified, but it may be desirable to pay heed their warnings, at least to the extent of restricting unnecessary and possibly dangerous uses of asbestos

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5. Cartier, P. (1952): Arch. Industr. Hyg., 5, 262.
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10. Brugsch, H. G. and Bayley, H. (1961): New Engl. J. Med., 264
11. Thomson, J. G. (1962): S. Afr. Med. J., 36, 759.
12. Thomson, J. G., Kaschula, R. O. C. and MacDonald, R. *Ibid.*, 37, 77.

BAKTERIËLE GENETIKA

Daar was 'n tyd toe dit aanvaar was dat die klassieke genetiese wette en beginsels nie op mikro-organismes, en veral bakterieë, van toepassing was nie. Bakterieë reproduseer vegetatief en hul mikroskopiese grootte het hulle ongeskik vir sitologiese studies gemaak. Vir baie jare was dit aanvaar dat daar fundamentele verskille, beide genetiés en fisiologies, tussen hoër diere en mikro-organismes bestaan en dat die wette wat op die een van toepassing is, nie vir die ander geld nie. Maar, gesien in die lig van die moderne fundamentele eenvormigheid tussen alle biologiese wetenskappe, is dit duidelik dat hierdie opvatting verkeerd was. Gemeenskaplike grond is gevind deur die intensiewe studie van bakteriële genetika wat slegs in die laaste twee dekades op die voorgrond getree het. Vandag is hierdie vak die brandpunt van die biologiese wetenskappe en het al selfs sovér gevorder dat dit amper die tergende vraag „wat is lewe?", kan verklaar.

Jacob en Wollman[1] verdeel die historiese ontwikkeling van bakteriële genetika in sekere tydvakke: Gedurende die laaste helfte van die 19de eeu is mikrobiologie as eksperimentele wetenskap ingestel en aandag is hoofsaaklik bestee aan die isolasie en morfologiese beskrywing van nuwe spesies. Van 1900 tot 1940 is 'n groot aantal variasies van bakterieë geïdentifiseer, bestudeer en beskrywe, en hieruit is die vak bakteriële genetika gebore. In die laaste tydvak, beginnende 1940, word bakteriële oorerwing ontleed en gekoördineer in die lig van die klassieke genetiese teorieë. Klassieke genetika ontleed die aard van komplekse, dikwels nie-essensiële, eienskappe. In teenstelling daarmee analiseer bakteriële genetika op die molekulêre vlak en gee 'n beter begrip van basiese sellulêre meganismes. Ook dien dit as 'n handige instrument waarmee die struktuur en funksie van biologiese sisteme bepaal kan word. Treffende bewys, dat daar 'n chemiese basis vir oorerwing bestaan, is gelewer toe 'n bakteriële eienskap omvorm is deur desoksieribonukleïensuur (D.N.S.), wat uit 'n pneumokokkale mutant[2] berei is. Soortgelyke ingrypende waarnemings is in die afgelope 20 jaar met bakterië gedoen waarvoor verskeie faktore verantwoordelik is. Om slegs 'n paar te noem: Bakterië kan, weens hulle ongeëwenaarde voortplantingsnelheid in 'n kort tyd tot enorme getalle aangroei. Die bakteriële sel se oorerwingsfaktore is vasgelê deur 'n enkele liniêre struktuur, die bakteriële chromosoom, bestaande uit D.N.S. wat die makromolekulêre patroon van die bakterium beheer. Bakterië se genetiese materiaal is relatief onstabiel. Mutasies kom spontaan voor in 'n gegewe gene in een uit honderd miljoen sel-verdelings. Eksperimentele na in bakteriële genetika tref deur hul eenvoud, akkura... en berekenbaarheid waarmee analiese uitgevoer kan

Die fundamentele probleme van genetika het bin... binne die bestek van die nie-genetikus geval. V... merkwaardigste bydraes op hierdie gebied is inder... gemaak deur fisici en biochemici. In 1953 bes... Watson en Crick,[3] Nobelpryswenners van 1962, die s... tuur van D.N.S., gebaseer op chemiese analiese en k... lografiese studies, wat allerweë as 'n biochemiese i... aanvaar is. Hiervolgens sou D.N.S. bestaan uit twe... nukleotied-kettings wat spiraalsgewyse rondom 'n s... as gedraai is. Die ruggraat van elke spiraal bestaa... fosfodiester-bande. Die basisse, op 'n gegewe ... die een ketting, word met behulp van waterstofbi... bind aan basisse op die ooreenstemmende vlak ... ander ketting. Waterstofbindings kan, weens str... redes, net plaasvind tussen die basis-pare adenien ... en guaniensitosien sodat die een ketting dan die beeld van die ander is. Dit is verbasend watter bel... biologiese gevolgtrekkings van hierdie model gem... word: Dit lewer bewys van D.N.S. se molekulêre kasie; die aaneenlopende liniêre volgorde van ba... gee aanleiding tot 'n bepaalde genetiese kode en ... teit, terwyl dit ook 'n verklaring vir mutasies ... nand gee. Hierdie model dien verder as voorbe... 'n nuwe studierigting, naamlik *molekulêre biol...* daargestel is hoofsaaklik deur die toedoen van ba... en virus-genetika. Hoe ver ons reeds vandag ge... van die klassieke sitologie blyk uit die feit da... genetika van dierlike somatiese selle op hierdie ... ontwikkel moet word, dit dan 'n direkte uitvl... bakteriële en virus-genetika is, wat weer op ha... hulle ontstaan aan weefselkulture te danke het

Die sentrale posisie wat atoomfisika vanda... fisiese wetenskappe beklee, kan ons vergelyk m... kulêre biologie in die biologiese wetenskappe. V... teorie is die praktyk van môre. In hoeverre ... genetika die natuurwette gaan beïnvloed, hang ... sukses waarmee die teorieë, wat sodanig ver... ander biologiese sisteme toegepas kan word.

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