FORUM

Forum is a new feature of the Journal which is intended to allow space for the expression of hypotheses, opinion, or speculation in a form that is not necessarily suited for the standard scientific paper. Also, correspondents may deal with matters arising from material published in the Journal at greater length than would normally be permitted in the correspondence columns. Authors whose papers are being commented upon will be given the opportunity to respond and they too will be permitted more space that they would enjoy in the normal course of events. If references are included in pieces intended for Forum they should follow our normal style; they should be kept to a minimum as should any accompanying tables or figures.

Forum begins with an exchange of views on asbestos and the asbestos industry between Castleman and Murray; it is hoped that it will stimulate others to submit material for inclusion in this section.

Letter to the editor, British Journal of Industrial Medicine.

Asbestos and cancer: history and public policy

Sir,—Murray has now twice stated in the pages of this journal that, "There was no knowledge of lung cancer or mesothelioma" attributable to asbestos during the second world war. He goes on to allude to the suppression of cancer findings by asbestos industry sponsored researchers at Saranac Lake, New York, commenting that this was not as reprehensible as some (including me) have said.[1 2]

The lessons we draw from asbestos for public policy and professional ethics would be few if Murray's picture of mere ignorance in the forties and hygienic practices worldwide today was accurate. We owe it to ourselves, the public, and the many workers who are dying from asbestos diseases to learn from this tragic history, lest it be repeated. Because history, like latency, has no statute of limitations, let us first consider what was recorded, and then turn to what was suppressed during the years at issue.

Following the publication of case reports of asbestosis in combination with lung cancer in the *American Journal of Cancer, Tubercle,* and the *American Review of Tuberculosis,* Nordmann in Germany published a paper entitled "The Occupational Cancer of Asbestos Workers," in 1938.[3–7] Nordmann emphasised certain aspects of the two cases he had seen, along with those reported previously by British and American pathologists. He observed that in Germany, as in Britain, there were 12 recorded autopsied cases of asbestosis, in two of which there was associated lung cancer. In all six cases of lung cancer/asbestosis known to Nordmann, the period from onset of exposure until death was between 15 and 21 years. These and other features of Nordmann's clinical epidemiology analysis satisfied others, including such authorities as Ludwig Teleky, who wrote abstracts of the papers by Nordmann and his colleague Hornig, published in the United States in 1938.[8 9]

In Germany, the view that asbestos was carcinogenic was supported by many and challenged by none after 1938. Leading German authorities such as Koelsch and Baader weighed in before 1940, with Baader announcing that German compensation authorities were treating lung cancer even in combination with "light" asbestosis as an occupational disease.[10 11] The federal government in Germany adopted this in legislation early in 1943.[12] By 1943, additional cases had been reported, and these writers and reviewers in Germany all agreed that lung cancer was an occupational hazard of asbestos workers.[13–21]

The German reports were carefully noted in Britain all through the war. The leading British authority on the pathology of asbestos disease, SR Gloyne, published abstracts of papers by Welz and Wedler in the *Bulletin of Hygiene.*[22 23] Wedler was the first to report primary cancers of the pleura as well as lung cancer in patients with asbestosis and assert that they were all occupational tumours. These abstracts by Gloyne were reprinted, with others on asbestosis and lung cancer, in the United States in the *Journal of Industrial Hygiene and Toxicology* and the *Industrial Hygiene Digest.* The latter was sent monthly to firms holding membership in the Industrial Hygiene Foundation, including Johns-Manville and a number of other asbestos companies.

The senior medical inspector of factories reported that there were 12 cases of lung cancer among 103 autopsied cases in which asbestosis was present (11·6%), as of 1938, when lung cancer was seen in less than 1% of autopsies in the United Kingdom.[24] Gloyne and Merewether raised the possibility of a cancer hazard from asbestos in a supplement to the International Labour Office Encyclopaedia, *Occupation and Health.*[25] Sparks meanwhile informed readers of the *British Journal of Radiology* that lung cancer was one of the complications seen in patients with asbestosis.[26]

Meanwhile, strikingly high rates of lung cancer among patients with asbestosis were consistently reported by pathologists in the United States.[27–29] For Kenneth Lynch, who was described by the president of Raybestos-Manhattan as "the doctor in charge of our spinning plant in North Charleston," this was the second such report in the *American Journal of Cancer.*[27 30] Not only were five more new cases reported in the *American Journal of Pathology,* but historical publications from around the world were also reviewed and tabulated in 1942 and 1943.[28 30]

Hueper's *Occupational Tumors and Allied Diseases* reviewed the international publications, enumerating the common factors pointing to an occupational relation between asbestosis and lung cancer.[31] In 1943, Hueper wrote that asbestos was unquestionably carcinogenic, and urged the substitution of carcinogens in industry with safer materials.[32] This article soon found its way to an executive at Johns-Manville Corporation, the largest American asbestos company, who loaned his copy to Dr Leroy Gardner, Director of the Saranac Laboratory.[33] More on them later.

Other United States authors wrote of the mounting evidence that asbestos caused cancer, in publications including the *New England Journal of medicine* and the *American Journal of Public Health.*[34–36] Writers in Canada, Norway, Italy, and France also expressed concern over evidence of the carcinogenicity of asbestos in the early 1940s.[37–41]

Editorials in the *Journal of the American Medical Association* in 1944 and 1949 named asbestos among the known and suspected causes of occupational cancer.[42 43] The second editorial was entirely devoted to asbes-

tos, and featured powerful evidence published by Merewether in the *Annual Report of the Chief Inspector of Factories for the Year 1947*.[44] By then, the Factory Inspectorate was aware of 235 deaths in which asbestosis had been found at autopsy, in 31 (13·2%) of which there was also cancer of the lung or pleura.

More recently, Becklake has concluded that the relation between exposure to asbestos and lung cancer attained the state of "probable" in the early 1940s.[45]

Gardner, writing for a United States government grant to study the asbestos-cancer question experimentally in March 1943, wrote that "Gloyne, Merewether, and other English observers contend that asbestos has a specific carcinogenic action."[46] He had evidently learned this from Merewether during the visit to the United States by the Factory Inspectorate's leading asbestos expert that winter.

So, it is beyond dispute that the carcinogenicity of asbestos was widely noted in prominent medical publications and English language abstracts by the early 1940s, and that concern was expressed within official circles in Britain and internationally. More complete accounting of the published (and unpublished) record may be found in my book, now in its third edition, which has never been reviewed in this journal.[47] I believe that Murray wrote a rather churlish review of the second edition which was rejected for publication—so his failure to recall that this body of knowledge existed is particularly unfortunate.

Two early experimental studies were suppressed, at least one of which had produced positive findings that inhalation of asbestos caused lung cancer. The first of these was reported in a cover letter and an attached outline of a monograph on asbestosis that Gardner sent to Johns-Manville executive Vandiver Brown in 1943.[48] This and related correspondence were discovered, through legal proceedings, in the files of Turner and Newall and Johns-Manville (now Manville) in the 1980s. One of the companies that had sponsored Gardner's research on asbestos in the United States was the T and N subsidiary, Keasbey and Mattison Company, whose president sent Gardner's material on to his counterpart at Rochdale on 8 March 1943.[49]

Gardner's research agreement with his corporate sponsors precluded him from publishing anything about his findings without their approval. Originally hired to do experiments on asbestosis that Raybestos-Manhattan's president said might prove useful to the companies in combating claims for compensation, Gardner was admonished about his vow of secrecy after he mentioned his studies in publications in the late 1930s. Gardner informed his sponsors in 1943 that, "The question of cancer susceptibility now seems more significant than I had previously imagined."[48] In his enclosed report, Gardner characterised both the published human data and his unpublished experimental studies as, "suggestive but not conclusive" in demonstrating carcinogenicity. He said he would defer publishing his experimental findings, in the hope that he would be able to get a government grant to repeat the work.

"Of 11 mice inhaling long fibre asbestos for 15 to 24 months, 8 developed malignant tumours in their lungs. . . *The incidence rate 81·8% is excessive,*" he wrote. "Of 22 mice inhaling short fibre asbestos for not longer than 12 months, only 3 developed lung tumors. *Rate 13·6%.*" Gardner concluded, "Thus the incidence of lung cancer in the long fibre asbestos mice was over 16 times the average for mice inhaling other dusts for comparable periods and over 3 times the maximum for any other group. Mice exposed to the practically inert short fibre asbestos showed fewer lung tumors although 7 times more than those in short exposures to other dusts."[48]

Although there were certainly ways in which this study could have been improved upon, it still represented the most extensive experimental investigation of the cancer aspect that had been done up to that time. And in his plea to the United States government's cancer advisory committee, Gardner said he was "startled" to have obtained such results.[46] A tearful Gardner confided to Harriet Hardy shortly before his death in 1946 that Johns-Manville would not allow him to publish his findings.[50]

After Gardner died, Johns-Manville officials renewed their pressure on the Saranac Laboratory to come up with a report. And finally, in 1948, Gardner's successor, Arthur Vorwald, sent a draft to Johns-Manville. Copies were circulated to presidents and vice presidents at each of the sponsoring companies, including Keasbey and Mattison, asking them all to, "Treat it with the utmost confidence." Johns-Manville's Vandiver Brown warned "It is obviously undesirable that the report in its present form receive any distribution or publicity outside a limited number of people in our respective organisations."[51] Attorney Brown's most prominent concern was getting Vorwald to delete his statements about the tumours, and he wrote that if Vorwald's report was confined to the animal studies, "Our right to criticise and suggest changes before publication, or even to forbid publication, is unquestionable."[52]

On 11 November 1948, executives representing eight of the nine sponsoring companies met in the Boardroom of Johns-Manville, and the decision was unanimous to strike all references to cancer and tumours. Reporting to the vice president of one company who had not been able to attend, Brown urged that a copy of the draft report be retrieved from that firm's medical director (Lloyd Hamlin), saying that, "Everyone thought it would be most unwise to have any copies of the draft report outstanding if the final report is to be different in any substantial respect. The feeling of the representatives was very emphatic on this point."[53]

The asbestos companies communicated their orders to Vorwald through Dr A J Lanza, who had established a very close relation with asbestos companies during his career with Metropolitan Life Insurance Company.[47] Lanza began by telling Vorwald the sponsors wanted him to omit all references to cancer and tumours from the report.[54] He also requested the insertion of a statement in the conclusions about the non-progressive character of asbestosis. Lanza's favours for asbestos companies spanned decades, and in some cases went beyond any ethical duty, but there is not space to retell that story here. (It has been told to New York University, which has so far resisted renaming its Anthony J Lanza Research Laboratories.[47])

Vorwald did as he was told, and his report published in January 1951 did not include the word cancer or any of its synonyms.[55] Vandiver Brown sent reprints to all the sponsors, saying, "I think we are entitled to conclude that the project was worth while."[56] Vorwald was rewarded with a contract for another confidential study of asbestos

carcinogenicity in mice, which appears also to have yielded positive results, and which was never disclosed publicly by Vorwald.[57] That research was initiated at the end of 1950, after Vorwald hosted the lawyer for the Quebec Asbestos Mining Association, a Johns-Manville executive, and Dr Lanza at Saranac.[58]

It is reprehensible that industry leaders and scientists suppressed such findings, enabling a controversy to be maintained in scientific circles beyond the 1940s. United States and British asbestos mining and manufacturing companies meanwhile profited from public ignorance about carcinogenicity of asbestos and were able to delay for decades the time when they would be forced to eliminate asbestos as a reinforcing agent in their thermal insulation and in many other products. The direct consequence is an epidemic of occupational cancer that is only now about to reach its peak.

As to conditions in the asbestos industry of today, Murray's description of "model" asbestos-cement factories is a far cry from the shocking footage in a 1988 documentary filmed by the Canadian Broadcasting Company in Thailand.[59] It is also inconsistent with recently reported Egyptian practices of emptying asbestos bales and mixing with cement manually.[60] Wherever information, regulation, and compensation are not in force, hazards from use of asbestos are to be expected.

Murray is wrong. His bland assertion that the asbestos companies were unaware of the carcinogenic potential of their products cannot erase the many scientific and medical studies that pointed to the contrary in the 1930s and 1940s, nor dispute that corporate leaders in the industry ignored the cautions and warnings of Lynch, Gloyne, Merewether, Nordmann, Gardner, Hueper, and their colleagues and were caught in the trap of their deceit. Giant corporations have become bankrupt, courts are clogged with tens of thousands of victims seeking redress. Jurists, outraged by evidence of "outrageous misconduct," pass verdicts of punitive damages—punitive, so that this will not happen again. Insurers, such as Lloyds of London, agree that the shenanigans will lead to the greatest loss burden they have ever experienced. But worst of all, the fate of tens of thousands of innocent victims stands as mute, terrible evidence of a tragedy that could have been prevented and was not.

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Reply by Murray

Sir,—Castleman chooses to criticise my account of the chronology of asbestos and its effects. I don't mind him doing this, for none of us is perfect. After all, I criticised his book, "Asbestos: Medical and Legal Aspects." Contrary to what he says, however, my review was not rejected for publication. It was never submitted. I was asked my opinion of the book by one of my colleagues in the London School of Hygiene and, having an unexpected weekend to spare, I read it and wrote what I thought. The book was published in 1986 and I wrote what I did in July 1988 so, even if I had wanted to, it was a bit late for a review.

To put the record straight and to let your readers determine whether it was "churlish" or not, this is what I wrote.

"Asbestos: Medical and Legal Aspects. Second Edition BI Castleman, Law and Business Inc 1986.
Mr Castleman does not like asbestos. He does not like the people who mine it, process it and adapt its products for sale. His dislike has grown into an obsession and his obsession into single issue fanaticism which closely resembles paranoia. In the fully developed form of this psychosis the individual adopts a false premise and then uses every device of selection and bias to support it. In the case of a person who thinks he is Napoleon or she is the Virgin Mary it is easy to recognise the false premise. It is less easy with a subject which has been ventilated in the media over the last 25 years to such an extent that the average man in the street tends to agree with the premise or something very like it—that asbestos has been an unmitigated disaster and that it should be banned.

In support of his hypothesis Mr Castleman has combed the world literature in a remarkable way. It is a pity that a book which has been so painstakingly researched should start with a false premise and arrive at entirely the wrong conclusions. It is characteristic of paranoia that the arguments are logical and well presented. It is the conclusion that is wrong, because it is arrived at in advance of the evidence and derives from emotion rather than scientific balanced appraisal.

The difficulty is that he is not entirely wrong. Asbestos is a dangerous material which has killed many people and will continue to do so, though less and less as our knowledge increases. Our main problem is that the effects of exposure are delayed up to 40 years, during which time our expectations are increasing and our diagnostic methods are improving so that we have to run fast to stay in the same place. Moreover, medicine has always had its priorities. Some subjects take the centre of the stage according to social demands of medical advances. What Mr Castleman does is to turn the spotlight, the blinding light of hindsight, on what was a very obscure problem and over illuminate it as though it had occupied centre stage for the greater part of this century.

At the very beginning he starts to bend the facts to suit his argument. Pliny did not recommend bladders as a protection against asbestos but against vermilion which caused acute mercury poisoning. It may be that some people in ancient times were affected by asbestos, just as our stone age ancestors may have been affected by silica from the manufacture or use of flint tools, but there is no evidence for Mr Castleman's comments about Roman slaves. None of the Greek or Roman physicians described the effects of asbestos, so that the statement that the disease was "discovered by the ancients," while adding historical colour and apparent verisimilitude, is manifest nonsense.

This temptation to dramatise and emotionalise is apparent throughout the whole book. I have not counted the emotional adjectives but the book is liberally besprinkled with them while the author flogs himself into a lather of indignation. One early example is a reference to the "devastating" pulmonary disease at the beginning of the century. There *was* such a disease, but it was called pulmonary tuberculosis and this was such an ever present disease that when Dr Murray discovered the first case of asbestosis in 1899 he did not publish it, even as a medical curiosity. He must have discussed it with his colleagues because he was invited to give evidence to the Department Committee on Compensation for Industrial Diseases in 1906 to which Mr Castleman makes reference.

At the beginning of the century there was a great deal of interest in industrial disease. The priorities were lead and mercury poisoning from which people were obviously dying, and phossy jaw, which destroyed the beauty of young women. The occupational chest diseases were so obscured by tuberculosis that the Departmental Committee of 1907 in the United Kingdom found itself unable to define these diseases adequately for compensation purposes even though the existence of potters rot, grinders asthma and ganister disease were well known. It was not until 1918 that the role of silica became manifest and this became the priority in research into occupational pulmonary disease to such an extent as to limit the study of asbestos because it was a silicate. This was true until the 1950s when coal workers pneumoconiosis took over centre stage. Silica and coal dust are still as fibrogenic as they always were but Mr Castleman awards no medals to the medicine and hygiene professions for having controlled these problems.

Instead he concentrates single mindedly on his subject and accurately, for the most part, records the references to asbestosis in the medical literature. What he lacks is a broad view of the developing subject. He approaches his task with the enthusiasm and intolerance of the new convert who has discovered the secret of salvation. His