

FILE NAME: Railroads (RR)

DATE: 1937 June

DOC#: RR004

DOCUMENT DESCRIPTION: Proceedings of the 17th Annual Meeting of the Medical and Surgical Section - American Railway Association

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1937

Association of American Railroads

PROCEEDINGS
OF THE
SEVENTEENTH ANNUAL MEETING
OF THE
MEDICAL AND SURGICAL SECTION

HOTEL TRAYMORE
ATLANTIC CITY, N. J.
JUNE 7, 8, 1937

PROCEEDINGS
OF THE
SEVENTEENTH ANNUAL MEETING
OF THE
Association of American Railroads
MEDICAL AND SURGICAL SECTION



HELD AT
HOTEL TRAYMORE, ATLANTIC CITY, N. J.
JUNE 7, 8, 1937

EASTERN PRINTING CORPORATION
NEW YORK, N. Y.
1937

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11. $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$

$\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 84

It is important to note that the above results are based on the assumption that the data are stationary. If the data are non-stationary, the results may be biased. Therefore, it is important to test for stationarity before conducting the regression analysis.

$\frac{1}{2} \left(\frac{1}{2} + \frac{1}{2} \right) = \frac{1}{2}$

[illegible]

1. *Journal of the American Medical Association*, 1990; 263: 1025-1026.

$$I_1 = \frac{1}{2} \int_0^1 \frac{1}{x} dx = \frac{1}{2} \ln 2$$
[illegible][illegible]

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Hale Holden, Chairman, Southern Pacific Company.
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(Term Expires in 1938)

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 Dr. Harvey Bartle (Vice-Chairman), Chief Medical Officer, Pennsylvania Railroad, Philadelphia, Pa.
 Dr. H. A. Beatty, Chief Surgeon, Canadian Pacific Railway, Toronto, Ont., Canada.
 Dr. J. Frank Duman, Chief Surgeon, Erie Railroad, Cleveland, Ohio.
 Dr. G. G. Dwydall, Chief Surgeon, Illinois Central System, Chicago, Ill.
 Dr. R. C. Webb, Chief Surgeon, Great Northern Railway, Minneapolis, Minn.

(Term expires in 1939)

Dr. D. B. Moss, Chief Medical Officer, Chicago, Burlington & Quincy Railroad, Chicago, Ill.
 Dr. S. B. Taylor, Chief Surgeon, New York Central Railroad, Columbus, Ohio.

(Term expires in 1940)

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 Dr. W. J. Lancaster, Superintendent & Medical Director, Relief Department, Atlantic Coast Line Railroad, Wilmington, N. C.
 Dr. A. R. Metz, Chief Surgeon, Chicago, Milwaukee, St. Paul & Pacific Railroad, Chicago, Ill.
 Dr. John R. Nilsson, Chief Surgeon, Union Pacific Railroad, Omaha, Nebr.

* Term as member of Committee of Direction expires in 1939.

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 Dr. J. C. Hall,
 Washington

Dr. J. R. Galt,
 Attorney,
 Dr. J. H. Mc
 Mountain
 Dr. A. C. Ste
 Railway
 Dr. F. C. W
 Dentist

Dr. W. J. J
 Surgeon

Dr. F. C. F
 Dr. J. C. G
 Dr. F. C. J
 Dr. J. C. B
 Dr. J. C. H
 Dr. J. C. S
 Dr. J. C. Z

Dr. J. C. G

Committee
 Dr. C. P. M
 Detroit,
 Dr. J. C. D
 Ill.
 Dr. C. C. G
 Peoria,

Honorary Members

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 Dr. Thomas Parran, Jr., Surgeon General, Bureau of the Public Health Service, Washington, D. C.

Committee on Disability and Rehabilitation

- Dr. J. R. Garner (Chairman), Chief Surgeon, Western Railway of Alabama, Atlantic City.
 Dr. John Macomber, Chief Medical Officer, Canadian National Railway, Montreal, Canada.
 Dr. A. C. Strachan, Chief Surgeon, Minneapolis, St. Paul & Northern Pacific Railway, Minneapolis, Minn.
 Dr. F. C. Warring, Chief Resident Surgeon, Western Maryland Railway, Baltimore, Md.

Representative from Committee of Direction

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Committee on Fractures

- Dr. Bradley L. Coley (Chairman), Chief Surgeon, New York Central Railroad, New York, N. Y.
 Dr. J. D. Collins, Chief Surgeon, Seaboard Air Line Railway, Norfolk, Va.
 Dr. T. L. Hansen, Chief Surgeon, Chicago, Rock Island & Pacific Railway, Chicago, Ill.
 Dr. Wm. Hibbitts, Chief Surgeon, St. Louis Southwestern Railway Lines, Texarkana, Ark.
 Dr. O. B. Zeierert, Chief Surgeon, Missouri Pacific Railroad, St. Louis, Mo.

Representative from Committee of Direction

- Dr. R. C. Webb, Chief Surgeon, Great Northern Railway, Minneapolis, Minn.

Committee on Developments Resulting from Physical Examinations

- Dr. G. P. Myers (Chairman), Medical Director, New York Central System, Detroit, Mich.
 Dr. Don Deak, Chief Surgeon, Chicago & Illinois Midland Railway, Springfield, Ill.
 Dr. C. C. Green, Chief Surgeon, Texas & New Orleans Railroad, Houston, Texas.

The Committee of Direction will select from its elective membership a Chairman and Vice-Chairman of the Section, whose terms of office shall be one year. A Chairman will not succeed himself.

(d) The Standing Committees of the Section will be as follows:

Committee on Disability and Rehabilitation

Committee on Fractures

Committee on Developments Resulting from Physical Examinations

Committee on Medical Aspects of Air Conditioning of Cars

The representation of member roads on these committees will be, so far as is practicable, territorially selected, in approximately the same proportions as that of the Committee of Direction, personnel to be named each year by the Committee of Direction immediately following adjournment of the annual meeting.

Duties of Officers

4. The **CHAIRMAN** shall have general supervision over the affairs of the Section and shall preside at meetings of the Section and at meetings of the Committee of Direction.

5. The **VICE-CHAIRMAN**, in the absence of the Chairman, shall perform the duties of the Chairman and such other duties as may be assigned.

6. (a) The **SECRETARY** shall perform the usual duties of that office and such other duties as may be assigned to him by the Chairman.

(b) He shall receive six weeks in advance of the annual meeting each year the report of the Committee on Nominations, as elsewhere provided for, and will submit to the membership at the annual meeting the nominations contained in that report, to fill the vacancies in the membership of the Committee of Direction. He shall announce the result of the election promptly to the members.

Duties of Committees

7. The **COMMITTEE OF DIRECTION** shall:

(a) Exercise general supervision over the interests and affairs of the Section.

(b) Be empowered to act on behalf of the Section in the interim between meetings and shall submit at each meeting a report covering its actions.

(c) Examine and decide what portion of communications, papers and reports shall be submitted at the meetings. It shall determine which, if any, of the subjects presented by the various committees, shall be referred to the General Committee of the Division.

(d) Appoint two months in advance of the annual meeting each year a Committee on Nominations, consisting of representatives of five member roads, who shall not be members of the Committee of Direction.

(e) Appoint additional committees as required.

(f) Submit to the Chairman, General Committee, detail of contemplated financial requirements for conducting the work of the Section as required or as called for by that official.

(g) Chair
General

to each
road

8. The CO
to each
road

9. COMME
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rehabilita
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10. COM
tion, and
rehabilita
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11. COM
RESULTING
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rehabilita
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12. COM
OF AIR CON
tion, and
rehabilita
tion

13. LETTE
tion, and
rehabilita
tion

(g) Call annual meetings of the Section, subject to the approval of the General Committee of the Division, if in its judgment conditions warrant.

(h) Call meetings of the Section, upon not less than thirty days' notice to each member. It must call special meetings of the Section upon the request, in writing, of a majority of the member roads.

8. The **COMMITTEE ON NOMINATIONS**, appointed as above prescribed, shall report to the Secretary at least six weeks in advance of the annual meeting of each year, at least two nominations for each impending vacancy to replace the four members of the Committee of Direction whose terms expire that year, and to fill any vacancy.

The duties of the Standing Committees shall be as follows:

9. **COMMITTEE NO. 1—The COMMITTEE ON DISABILITY AND REHABILITATION** shall study and report, with suggestions or recommendations, on such subjects that have to do with the physical efficiency or inefficiency of railroad employees. It shall also consider ways and means for the rehabilitation of injured or incapacitated employee and the complete restoration of function.

10. **COMMITTEE NO. 2—The COMMITTEE ON FRACTURES** shall study and report on the treatment and transportation of fracture cases including (a) Diagnosis of fractures, (b) First aid and transportation splints, (c) Fracture report forms, (d) X-ray work in connection with fractures, and similar subjects.

11. **COMMITTEE NO. 3—The COMMITTEE ON DEVELOPMENTS RESULTING FROM PHYSICAL EXAMINATIONS** shall analyze and make report, with recommendations or suggestions, on data made available by periodic examinations, etc. It shall study and revise as conditions may warrant, the recommended standards covering physical examinations as well as the forms used in connection therewith.

12. **COMMITTEE NO. 4—The COMMITTEE ON MEDICAL ASPECTS OF AIR CONDITIONING OF CARS** shall study and report on this subject in its relation to the health and comfort of travelers, cooperating with other departments handling matters relating to air conditioning of equipment.

13. **VOTING AT MEETINGS OF SECTION:** (a) Vote may be taken viva voce, by rising, by roll call or by ballot. Each member road shall be entitled to one vote. The vote of the majority of the member roads represented shall be required to decide any question, motion or resolution, unless otherwise ordered. (b) Voting for candidates for membership on the Committee of Direction shall be by ballot. (c) Unless otherwise designated by it, the ranking officer will be recognized as the voting representative of a road at any meeting.

14. **LETTER BALLOTS** may be taken upon any subject by order of the Committee of Direction and must be taken on all questions affecting physical property. The voting power of the member roads shall be proportionate to the ownership of miles of track.

business at meetings of the
city of the members present.

meeting of this Section,

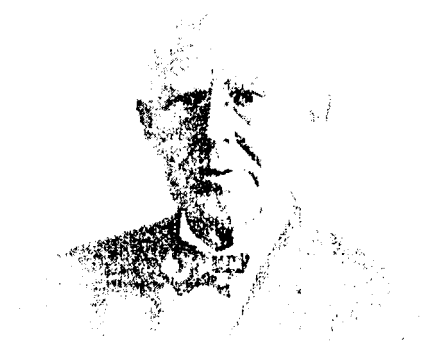
MEDICAL AND SURGICAL SECTION

Hotel Travmore, Atlantic City, N. J., June 7-8, 1937

The following representatives were present:

| Members | Representatives |
|---|---|
| Akron, Canton & Youngstown Ry. | J. D. Smith, Chief Surgeon. |
| Ann Arbor R. R. | A. M. Hance, Chief Surgeon. |
| Athens & West Point R. R. | J. R. Garner, Chief Surgeon. |
| | H. C. Crawford, Ophthalmologist. |
| | Carter Smith, Consulting Internist. |
| Atlantic Coast Line R. R. | W. J. Lancaster, Superintendent and
Medical Director, Relief Department. |
| Belt Ry. Co. of Chicago | J. G. Frost, Chief Surgeon. |
| Canadian National Rys. | K. E. Dowd, Assistant Chief Medical
Officer. |
| Chesapeake & Ohio Ry. | J. Frank Dintien, Supervising Surgeon. |
| | J. J. Brandabur, Assistant Supervising
Surgeon. |
| Chicago & Eastern Illinois Ry. | J. G. Frost, Chief Surgeon. |
| Chicago & North Western Ry. | Alfred Brown, Division Surgeon. |
| | J. K. Stuck, Assistant Surgeon. |
| Chicago & Western Indiana R. R. | J. G. Frost, Chief Surgeon. |
| Chicago, Burlington & Quincy R. R. | D. B. Moss, Chief Medical Officer. |
| Chicago, Milwaukee, St. Paul & Pacific
R. R. | A. R. Metz, Chief Surgeon. |
| Chicago, Rock Island & Pacific Ry. | T. L. Hansen, Chief Surgeon. |
| | R. A. Jacobson. |
| Cleveland, Cincinnati, Chicago & St.
Louis Ry. | L. A. Ensminger, Chief Surgeon. |
| Delaware & Hudson R. R. Corp. | J. W. Ghormley, Surgeon. |
| Delaware, Lackawanna & Western
R. R. | J. Norman White, Chief Surgeon. |
| Erie R. R. | J. Frank Dintien, Chief Surgeon. |
| | W. E. Mishler, Assistant to Chief
Surgeon. |
| Georgia R. R. | J. R. Garner, Chief Surgeon. |
| | H. C. Crawford, Ophthalmologist. |
| | V. P. Sydenstricker, Consulting Intern-
ist. |
| Gulf, Mobile & Northern R. R. | C. H. Ramsey, Acting Chief Surgeon. |
| Illinois Central System | G. G. Dowdall, Chief Surgeon. |
| | C. H. Ramsey, Surgeon. |

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| Long Island R. R. | Harvey Bartle, Chief Medical Examiner. | Boston & Maine
Pulham Co. |
| Louisiana & Arkansas Ry. | J. S. Moses, Medical Examiner. | |
| Louisville & Nashville R. R. | P. D. Abramson, District Surgeon. | Railway Expt.
Reading Co. |
| Missouri Pacific R. R. | Duncan Ewe, Jr., Division Surgeon. | |
| | O. B. Zeinert, Chief Surgeon. | |
| | J. A. Lembeck, Visiting Surgeon. | |
| | D. S. Long, Local Surgeon. | |
| Nashville, Chattanooga & St. Louis
Ry. | Duncan Ewe, Jr., Chief Surgeon. | |
| New York Central System | G. P. Myers, Medical Director. | |
| | Frank V. Whiting, General Claims
Attorney. | St. Louis, Mo. |
| New York Central R. R. | Bradley L. Coley, Chief Surgeon. | St. Louis |
| | S. B. Taylor, Chief Surgeon. | Seaboard Ry. |
| New York, Chicago & St. Louis R. R. | J. Frank Dumen, Assistant Chief Sur-
geon. | Tulsa, Okla. |
| Norfolk & Western Ry. | M. A. Johnson, Jr., Assistant Chief
Surgeon. | Union Pa. |
| Northern Pacific Ry. | A. W. Ide, Chief Surgeon, Eastern
Division. | W. Va. Ry. |
| Pennsylvania R. R. | R. C. Morse, Vice-President (Eastern
Region). | Washington P. |
| | Harvey Bartle, Chief Medical Exam-
iner. | Western Md. |
| | G. L. Alexander, Medical and Com-
pany Surgeon. | Western Pa. |
| | Walter Aye, Medical Examiner. | |
| | A. Bruce Gill, Consultant Orthopedic
Surgery. | |
| | J. W. Harper, Medical Examiner. | |
| | H. E. Hoston, Medical Examiner. | |
| | I. S. Howard, Medical Examiner. | |
| | S. W. Hurst, Medical Examiner. | |
| | N. R. Ingraham, Assistant Oculist. | |
| | A. P. Isenberg, Company Surgeon and
Medical Examiner. | Virginian Ry. |
| | T. B. L. Jordan, Medical Examiner and
Company Surgeon. | Colony Ry. |
| | R. C. Kell, Neurologist. | The B. & O. Ry. |
| | J. S. Moses, Medical Examiner. | |
| | J. Edward Nickel, Medical Examiner. | United States P. |
| | H. M. Persing, Jr., Assistant Medical
Examiner and Oculist. | University of P. |
| | J. A. White, Medical Examiner. | |
| Pennsylvania-Reading Seashore Lines | A. P. Isenberg, Medical Examiner and
Company Surgeon. | |



Dr. D. B. MOSS, Chairman

The Sevent
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MONDAY MORNING SESSION

June 7, 1937

The Seventeenth Annual Meeting of the Medical and Surgical Section of the Association of American Railroads convened at the Traymore Hotel, Atlantic City, New Jersey, at nine thirty o'clock, Dr. D. B. Moss, Chairman, presiding.

THE CHAIRMAN: Gentlemen, we will now begin our Seventeenth Annual Meeting.

The first item on the program is "announcements" which will be presented by the Secretary.

. . . Announcements . . .

THE SECRETARY: A few days ago I received the following wire from Dr. McCombe, of the Canadian National Railways, dated "Toronto:" "Greatly regret owing to continued ill health impossible for me to attend annual meeting of Section Regards" Signed "John McCombe."

DR. G. G. DOWDALL (Illinois Central System): I move that the Secretary be requested to wire Dr. McCombe and convey our extreme regrets at his unavoidable absence, and our hope for his early recovery, with lots of love.

. . . The motion was seconded, was put to a vote and unanimously carried . . . The Secretary then wired Dr. McCombe as follows: "Medical and Surgical Section in convention assembled extremely regrets that illness prevents you from being present today. Best wishes from all for a speedy recovery."

THE CHAIRMAN: The next number on the program is an address by the Chairman. I haven't an address, but I have a few remarks to make on a subject which I think will become of increasing interest to us as time goes by; that is, occupational diseases, and I want to refer particularly to the Illinois law which was passed last year.

OCCUPATIONAL DISEASES--THE ILLINOIS LAW

By

D. B. Moss, M. D.

The subject of occupational diseases has become a matter of great importance in the last two years, and is of concern to the employer, the employe, and the public as well, because the livelihood of so many citizens of the state depends upon the continuing good health of employes working in these recognized hazardous occupations. I have chosen this subject for discussion for the reason that for the past year I have been a member of a committee known as the Railway Engineering and Shop Committee. This committee was appointed by the

General Managers' Association of Chicago to make a survey of present practices and equipment of the railroads operating within the state of Illinois and submit recommendations which would serve to bring these railroads into substantial compliance with the requirements of this new law. There are 31 Class I railroads operating within the state, and considering short lines, there are 78 railroad corporations more or less interested in the subject of occupational disease. This investigation and the reports which will be issued will be of the greatest importance to these roads, and may serve the interests of railroads in other states, because the indications are that such legislation by other states will not be long delayed.

From time to time, this committee has issued bulletins recommending procedures designed to minimize the risk of exposure in occupations known to carry a hazard and which are of immediate concern to the railroads. Forty-six states now have Workmen's Compensation Acts which provide for compensation for accidental injury causing disability or death. Recognition of the principle of compensation for occupational diseases has been slow, and even now only 16 states have any provisions for compensation for disability or death due to an occupational disease. Many of these states do not provide for complete coverage. The Illinois Occupational Diseases Act was approved March 16, 1936, to take effect October 1, 1936. Accompanying this Act were two others—the Health and Safety Act, and the Grinding, Polishing and Buffing Act. This latter is a temporary measure bridging over the period until the Industrial Commission establishes rules having the effect of law to replace all previous legislation in certain fields.

Section 6 of the Health and Safety Act provides that the Industrial Commission may appoint an advisory committee to suggest rules or changes in existing rules. Representation on this committee must be equally divided between employer and employees. It is under this provision that the Railway Engineering and Shop Committee acts in assisting the railway member of the committee.

Section 2 provides that this Act shall apply to all employers engaged in any occupation, business or enterprise in the state of Illinois, and their employees, the only exemption being the agricultural class.

Section 3 provides that it shall be the duty of every employer under this Act to provide reasonable protection to the lives, health, and safety of all persons employed by such employer. The Industrial Commission shall from time to time make, promulgate, and publish such reasonable rules as will effectuate such purposes.

Section 4 provides that to effectuate the purposes stated in Section 3, the Industrial Commission shall make rules for (a) Proper sanitation and ventilation of all places of employment to guard against personal injuries and diseases. (b) The arrangement and guarding of machinery and the storage and placing of personal property to guard against personal injuries and diseases. (c) The prevention of personal injuries and diseases by contact with any poisonous or deleterious dusts, vapors, gases, or fumes. (d) The prevention of personal injuries or diseases caused by exposure to artificial atmospheric pressure.

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It is this law for the prevention of disease or injury which urgently demands our best thought. The Workmen's Occupational Diseases Act is optional. The employer may elect to operate under its provision by simply filing notice with the Industrial Commission to that effect, in which case his liability is limited to the provisions of the Act. The employer who chooses to remain under the common law takes no action. His liability is limited only by the amount fixed by the jury after weighing all of the evidence presented in the trial of the case, except that for death the maximum is \$10,000. It is further provided under the common law that it shall not be a defense that the employee expressly or impliedly assumed the risk, or that the disease or death was caused in whole or in part by the negligence of a fellow servant. Also, that any violation of the rules of the Health and Safety Act shall constitute negligence of the employer.

The primary purpose of the Workmen's Occupational Diseases Act, like the Workmen's Compensation Act, is to provide security to the employee and his family when he is overtaken by the tragedy of disability or death. The primary purpose of the Health and Safety Act, through the penalties provided for failure to comply with its provisions, is to compel the employer to install safety devices or take such other action as will protect the employee from accident or disease. Be it understood that no employer, whether under the compensation act or under the common law, is relieved of the necessity of complying with the Health and Safety Act. The penalty for the first failure upon conviction is a fine of not less than \$25 and not more than \$100, and subsequent failures not less than \$50 nor more than \$200. Each day of failure constitutes a separate offense.

Referring again to the provisions of the Occupational Diseases Act, Section 5 provides that under the Act the employer shall be liable for compensation on account of an occupational disease which occurs within one year after the last day of the last exposure to a hazard, except in cases of silicosis and asbestosis, where the liability extends to three years. Section 3 provides that the employer under the common law is liable for three years after the last day of the last exposure to the hazards of the disease, and that every such action for damages in case of death shall be commenced within one year after the death of such employee, and within five years after the last day of the last exposure to the hazards of the disease. It is quite evident from these provisions that the employer is not immediately quit of an employee who resigns or who leaves the service from any other cause.

Prevention of occupational disease is of greater importance, more humane and less expensive, than the palliative of paying compensation after the disease has developed. The principle of this law is sound, and I believe that no person opposes the idea of compensation for disability or death whenever it is clear that the immediate cause can be attributed to a hazard which is associated with an employment. The proper application of the law will be difficult, and will require the intelligent cooperation of every agency concerned in its administration.

One of the dangers lurking in the Workmen's Occupational Diseases Act is the propaganda in the educational program of the State Department of Labor.

cy of present practices of Illinois and submit roads into substantial are 31 Class I rail- it lines, there are 78 bject of occupational t issued will be of the interests of railroads in lation by other states

recommending pro- ations known to carry and. Forty-six states for compensation for on of the principle of ed even now only 16 y or death due to an provide for complete approved March 16, Act were two others— nd Butting Act. This l until the Industrial e replace all previous

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ployer under this Act l safety of all persons n shall from time to les as will effectuate

ted in Section 3, the nitation and ventila- injuries and diseases. e storage and placing nd diseases. (c) The ith any poisonous or evention of personal spheric pressure.

1. *Staphylococcus aureus* (10⁸ CFU/ml)
 2. *Staphylococcus aureus* (10⁷ CFU/ml)
 3. *Staphylococcus aureus* (10⁶ CFU/ml)

As a consequence, the proportion of the total variation in the response variable that is due to the treatment effect is 100%. It is important to emphasize that the proportion of the total variation in the response variable that is due to the treatment effect is 100% only when the response variable is the difference between the two groups.

Medical co-
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ductivity.

It is important to note that the authors do not claim that the model is a perfect representation of the real world. They acknowledge that the model is a simplification of the real world and that there are many factors that can influence the results. However, they argue that the model is a useful tool for understanding the basic principles of the system and for identifying the key factors that influence the results.

After a few days, the pond became very muddy and the water level continued to drop. I applied close supervision during the drying process, and when it became no longer profitable, I

s of pamphlets were printed in a fragmentary way the kinds of work which may create a fear complex, and has an occupational disease, making many of the symptoms. It is to this is more a few.

the fact that silicosis is a disease which may have to do with whatever sent someone in the Journal making silicosis, but that people may cause some initial harm when is rated as only on the order of 5 or 10 per cent. grinding, polishing, any way, but maintain the which they come, the only particles are and the harder cause permanent changes in thought in regard to the that the hard particles of osis, and the other that the becomes a cellular poison.

ences generating toxic dusts se we may perhaps add coal ute or other enclosed places, chimney report was issued health conditions, including tative anthracite coal mines among the group was 23%. es where dust exposure was s of anthracite-silicosis were in dust containing 5 million % silica, 7% developed an- tion to 199 million particles is theosis, and with the dust t. ft., 89% of the employees the data for the purpose of s that employment in an s per cu. ft. would produce when the quartz content of ent was about 13%, a safe les per cu. ft. It is obvious other poisonous substances

used in or generated by manufacturing processes and of unfavorable working conditions, is the first essential in preventing and controlling occupational diseases.

A large part of the problems which will arise will relate to the question of disability, and will be medical problems, consequently the medical profession, particularly those who are interested in the industrial phases of medicine, must solve them. The problems which will arise in the application of the Health and Safety Act and the prevention and control of occupational diseases will be engineering; and the less it is important that the medical men be familiar with the engineering features in order to assess the proper value between cause and effect. It is apparent, therefore, that prevention and control demand the co-operative efforts of the engineering and the medical professions. The two professions that industry and labor alike must look for a solution of the problems which will arise.

Medical control consists of a careful pre-employment occupational history extending over a period of five years at least, and supplementing post-employment history, a careful physical examination, paying particular attention to any signs indicating diseases of the heart or lungs, aided by any laboratory investigation which the physical findings may suggest. The environment in which an employee may be required to work makes necessary this inquiry into the personal and occupational history, to ascertain that there is no history of previous exposure which may have caused impairments and no condition present which may be made worse by the occupation.

It is important, also, that careful inquiry be made into the history of employees who come for aid, if a correct diagnosis is to be made and a proper balance struck between diseases which are unfavorably influenced by occupation and other diseases in which occupation has no bearing. Therefore periodic physical examination of all employees, in so far as that is possible, is important. In occupations in which known hazards exist, such as when workers are exposed to lead or in sandblasting, examination should be made semi-annually, or more frequently whenever there appears to be indication for doing so, with transfer of employees who are becoming impaired, to less hazardous work.

Engineering is concerned in investigating the occupational environment, estimating the hazards scientifically and instituting the proper methods for control, and thereafter supervision to make certain that the safeguards which have been installed are adequate and their performance effective. Whether the matter is removal of silica dust, coal dust, or the dust or fumes of lead or zinc, the basic principle remains unchanged—ventilation by a method best adapted to meeting the condition to be solved. We have for consideration: (1) The use of mechanical devices, such as exhaust ventilating systems applied to the room or to the plant as a whole, or local exhausts through a suction hood applied close to the point of dust generation. (2) Changing the processes: Substituting non-poisonous materials for those known to be poisonous; substituting wet grinding for dry grinding; or changing from natural sandstone grinding wheels to artificial abrasive wheels which are harder and contain but little or no free silica. (3) Personal protection: Control of hazard by means of protective equipment furnished the individual employee, provided the device

is effective and the employe can be depended upon to wear it continuously while at work. Thereafter it is a matter of good housekeeping--knowing that the atmosphere is maintained in a state which is not a hazard to the workmen. All dusts and all poisonous fumes may not be completely eradicated, but they may be controlled and reduced to a degree which is recognized by sanitarians and by experience to be non-hazardous. This can be accomplished by frequent dust counts of the air at a point where dust is generated, or chemical examination of air samples where lead or other poisonous materials are used. Sandblasting is perhaps the most dangerous dust producing agency to which employes may be exposed, because the sand used is a pure silica which produces a veritable dust flood. Sandblasting has come into extensive use on railroads in recent years. In the shops it is used for cleaning and polishing small articles. It is also used in removing paint from cars, buildings, and steel water tanks, preparatory to repainting. Used indoors it is imperative that all employes be protected, consequently a dust-proof cabinet or room, fitted with a local exhaust system, will be required. Only the air pressure mask is safe for the employe engaged in sand-blasting cars or buildings, and this work should be done only when other employes are not required to work in the vicinity. The air hose should be long enough to bring the air from outside the dust zone, or the air should be washed by being forced through a water bath.

A respirator is a filtering device for removing particulate impurities from the air and is not effective against gaseous impurities. Special masks for this purpose are manufactured. The essentials of a respirator are a close fitting and dust-proof face piece covering mouth and nose, with a minimum of dead space to prevent accumulation of carbon monoxide, the inhalation and exhalation valves must not cause effort in breathing and must be dust-proof, the filtering device should have an exposed surface area large enough to permit free breathing, the filter discs should be easily removable for replacement, and the respirator should fit comfortably and not obstruct vision, and should permit of wearing spectacles or goggles. There are various types of respirators which may be used for non-toxic dusts or for short exposure to toxic dusts. I would recommend that only respirators and gas masks which are approved by the U. S. Bureau of Mines be furnished to employes.

Silicosis and asbestosis are strictly dust diseases, and can be contracted only by breathing silica or asbestos dust. Lead poisoning is most frequently contracted by breathing the dust or fumes of lead, rarely by ingesting lead. Prevention and control, therefore, consists of protecting the employe against exposure by the means best adapted to preventing the generation and dispersion of these harmful dusts.

THE CHAIRMAN: We have received the following wire from Mr. J. M. Symes, Vice-President, Association of American Railroads, same having been addressed to Dr. Bartle as Chairman of the Program Committee:

"WASHINGTON, D. C., June 5, 1937.

Dr. Harvey Bartle:

Your letter June second. Because of some pressing matters of unexpected development here in Washington it will be impossible for me to

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(Circular M. & S. 190)

ASSOCIATION OF AMERICAN RAILROADS

MEDICAL AND SURGICAL SECTION

REPORT OF COMMITTEE ON DISABILITY AND REHABILITATION

Dr. J. D. Collins (Chairman), Chief Surgeon, Seaboard Air Line Railway.
 Dr. T. L. Hanson, Chief Surgeon, Chicago, Rock Island & Pacific Railway.
 Dr. W. J. Lancaster, Superintendent & Medical Director, Relief Department, Atlantic Coast Line Railroad.
 Dr. John McCombs, Chief Medical Officer, Canadian National Railways.
 Representative from Committee of Direction,
 Dr. J. R. Garner, Chief Surgeon, Western Railway of Alabama.

NEW YORK, N. Y., May 6, 1937.

TO THE MEDICAL AND SURGICAL SECTION:

Your Committee regrets that it is unable to offer much new material in this report. An endeavor has been made to review some of the previously discussed subjects and bring them up to date. We feel that in the future this Committee should undertake more research work in the rehabilitation of employees who are disabled on account of injuries and diseases. The Committee will welcome any helpful suggestions in this connection.

The Use of Sodium Chloride by Workmen Exposed to High Temperatures

During the past thirty years numerous articles have been written on the use of sodium chloride by workmen exposed to high temperatures, following investigations by physiologists and various medical officers of industrial concerns. It was noted by these investigators that exposure of human beings to extreme heat causes both heat cramp and heat exhaustion. These two conditions are essentially different as regards symptoms, treatment and prognosis.

In heat cramps the etiological factor is a disturbance of the water salt metabolism, whereas in heat prostration the cause lies in a disturbance of the thermo regulating system. In heat prostration the complaints are of weakness, headache and vertigo, all of which develop so suddenly that often the victim collapses at work. In cases of heat prostration the workman is usually fit to return to work within two days, whilst in cases of heat cramp, it takes four or five days for restoration of body weight and of normal blood picture as far as haemoglobin and salt are concerned.

Heat cramps are also often called "Miners' Cramps," "Muscle Cramps" and sometimes wrongly called "The Bends." The condition consists in painful tonic spasms of any of the skeletal muscles, but usually of those most actively in use.

Heat causes increased circulation through the capillaries of the skin and some authorities claim that with high temperature and high humidity there is a marked increase in the pulse rate, systolic blood pressure and in body temperature. These all tend to increase perspiration. Sweat contains at least 25% of chlorides principally sodium chloride. Prolonged perspiration depletes first the sodium chloride content of the blood, then the chlorides from the muscles. The loss of chlorides through the skin is also shown by the decrease or disappearance of the chlorides from the urine. The diminished salt excretion continues for some hours after the normal balance and concentration in the blood is restored. The drinking of large quantities of water to relieve thirst further diminishes the percentage of chlorides in the blood. Water without salt ingested under such conditions is not retained but is quickly lost through the sweat and the urine without replenishing the store of plasma in the muscles.

About 1923, J. S. Haldane, the English Physiologist, suggested that the cramps suffered by miners were due to salt loss. They were urged to drink only salt water (10 gm. to the gallon). Most of them had no further cramps and they complained of less fatigue than formerly. It was also observed that the men using the salt water did not drink such large quantities of water as did the other.

In recent years dextrose solutions have been used extensively in some of the large steel mills in the treatment of heat cramps and it appears that some successful results have been obtained. It is possible that dextrose may assist in the mobilization and utilization of salt stored in the tissues and needed by the muscles.

The most important factors in the production of heat cramps are:

- (1) High temperature surrounding the worker, high humidity and low air velocity. Cramps rarely occur among men working in the open regardless of the temperature.
- (2) Muscular effort.
- (3) Physical condition of the worker. Recent ingestion of alcohol, inadequate sleep, inadequate food and intercurrent disease predispose to cramps.
- (4) Acclimatization is also an important factor. Men who have been continuously employed on the same type of work seem to be able to work and sweat more efficiently than after periods of inactivity. Inexperienced men starting on hard work in the heat are particularly liable to develop cramps. Cramps and heat exhaustion are likely to appear on the first hot day following a cool spell. There does not appear to be any constant racial predisposition as far as black or white is concerned, but the thin, wiry man is more commonly affected than his obese fellow worker.

It is concluded that heat cramps are relieved by the administration of salt solution. The question of administration of sodium chloride as a prophylactic against the occurrence of this condition among certain groups of employees might be considered.

While sympathy is extended by the Association of American Railroads to all applicants for relief, it does not provide any measure for the relief of such cases.

Employees who are injured from heat are allowed to rest and are not allowed to resume hazardous work until they are sufficiently recovered to do so.

Neurosyphilis is a disease of the nervous system which is caused by the bacterium *Treponema pallidum*.

It is a disease of the nervous system which is caused by the bacterium *Treponema pallidum*. It is a disease of the nervous system which is caused by the bacterium *Treponema pallidum*.

Attention is directed to the fact that the patient of neurosyphilis must be treated with care and that the patient must be kept under observation.

The terms "neurosyphilis" and "neurosyphilis" are used interchangeably. The term "neurosyphilis" is used in the text of this report.

Early in the history of the disease, the patient is usually in good health. The patient is usually in good health. The patient is usually in good health.

Neurosyphilis is a disease of the nervous system which is caused by the bacterium *Treponema pallidum*. It is a disease of the nervous system which is caused by the bacterium *Treponema pallidum*.

During the early stages of the disease, the patient is usually in good health. The patient is usually in good health. The patient is usually in good health.

The pathogenesis of neurosyphilis is a disease of the nervous system which is caused by the bacterium *Treponema pallidum*. It is a disease of the nervous system which is caused by the bacterium *Treponema pallidum*.

capillaries of the skin and some and high humidity there is a pressure and in body temperature. Sweat contains at least 25% sodium chloride. Excessive perspiration depletes first the sodium chloride from the muscles, followed by the decrease or disturbance of salt excretion and concentration in the tissues of water to relieve thirst in the blood. Water without salt is quickly lost through pores of the skin in the muscles. A physiologist suggested that the men be urged to drink plenty of water. It was also observed that large quantities of water as did

be used extensively in some of the men and it appears that some suggestion that dextrose may assist in the tissues and needed by the

of heat cramps are:
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2. men working in the open

3. ingestion of alcohol, inadequate current disease predispose to

factor. Men who have been in the heat of work seem to be able to work after periods of inactivity. Work in the heat are particularly prone to heat exhaustion and heat cramps. There is a racial predisposition as far as the thin, wiry man is more com-
mon.

4. the administration of salt in the form of sodium chloride as a prophylactic for certain groups of employees

Syphilis

While syphilis occupies a most important position as a hazard among railroad employees, practically nothing can be added to the data previously reported by this Committee. Every effort should be exerted to prevent employment of syphilitically infected persons, and to this end a blood test of all applicants for employment is strongly urged. While a negative blood chemistry does not preclude the presence of syphilis, it constitutes the only tangible measure for examination in the absence of obvious pathological symptoms.

Employees contracting the disease after entrance into service should be withdrawn from service during the active stage of communicability, and should be allowed to resume their work only when they may safely be considered as non-hazardous to others. They should be kept under observation, however, for a sufficient period of time to permit a cure to be effected; under no circumstances will this be less than two years.

Neurosyphilis is of course the form that constitutes the greatest hazard in railroad service, and any employee manifesting symptoms of neurosyphilis should be removed from unrestricted train service.

Fever therapy for the treatment of neurosyphilis is comparatively new and while it offers relief for the unfortunate individual who has been so afflicted, its ultimate results have not as yet been sufficiently proven to justify the re-employment of individuals so treated in any position where they may become a hazard to either themselves or others.

Attention is also called to the untoward effects that frequently develop in patients of moderately advanced age when they are subjected to intense anti-syphilitic treatment by the arsphenamines. It may be a better practice to subject these patients to a less vigorous treatment and keep them under continuous observation.

Hypertension

The terms arterial tension or blood pressure have come to mean the degree of pressure within the arteries, as measured and recorded in terms of millimeters of mercury. The blood is essentially a passive medium; changes in pressure result from changes in the arterial walls.

Early studies in the blood pressure were really studies of the pulse. It was not until 1828 that the U-shaped mercurial manometer was devised; the present accurate method of sphygmomanometry dates from then. The present type of sphygmomanometer dates from 1896.

No specific figure may be stated as representing the normal arterial tension. During childhood the arterial tension is variable, the gradual childhood rise ceasing at approximately 18 years of age. In healthy adults the normal arterial tension ranges from 110 to 140 mm systolic and from 70 to 85 diastolic, gradually rising to higher figures with increasing age. Arterial tension may be defined as existing whenever the systolic tension exceeds 160 or the diastolic tension is 100 mm or more, or both.

The pathogenesis of hypertensive arterial disease starts with increased arteriolar tonicity or spasticity. This hypertonia may result from anything which stimulates or irritates the arterial walls.

Of the many sources of arterial irritation, certain factors stand out conspicuously because of the frequency with which they appear. Of all those involved, foci of infection, hereditary predisposition, maladjustment of the dietary, fatigue, endocrine dysfunction, etc., are the most frequent.

For practical clinical purposes the simplest classification is probably the most useful. Arterial hypertension may be seen early, at which time it is "spastic," with wide variations of the tension on different occasions, due to marked changes in the arterial tonus; it may be seen late, when it is "sclerotic," with relative fixed diastolic tension, due to the fibrotic changes in the vessel walls. The two types are not, however, different forms of arterial disease, but different stages of the same disease process. Hypertension may or may not be complicated by associated disease, such as diabetes or thyro-toxicosis.

In certain instances the progression of the arterial disease is markedly accentuated. Degenerative changes appear very early and progress is rapidly downward. To this group the term malignant hypertension has been applied.

In checking over records of examinations of applicants for employment made twenty years ago we find very few rejections on account of high blood pressure. The majority of these were negroes. During the past few months a group of approximately three hundred men between twenty and forty years of age, showed a ten per cent rejection on account of hypertension. Many of these were young men who had not been permanently employed during the past four years. Quite a few of these have been rechecked at frequent intervals, and in a few cases following regular employment the tension has returned to normal.

Epilepsy

Some ten years ago this Committee began an extensive survey on the subject of Epilepsy, and made reports to the Section at its annual meetings in 1927, 1928, and 1929. The subject has again been considered this year by special request.

Epilepsy, per se, presents no features among railroad employees which differ in any respect from persons engaged in any other pursuit; the hazard, however, is obviously much greater when the condition is manifest in railroad employees and the hazard increases to a marked degree if the afflicted employee be engaged in engine, train, yard or signal service.

Obviously any applicant for employment in railroad service who admits the history of epilepsy or of unsatisfactorily explained periods of unconsciousness should be rejected. Rarely, however, will the applicant admit such occurrences, and a physical examination made more than thirty-six hours after an epileptic seizure will fail to reveal any diagnostic characteristics with a single exception of trauma that has been inflicted upon the tongue. For this reason, all applicants for employment in any position where they may become a hazard to either themselves or others the tongue should be carefully examined for scars indicative of its having been bitten during a convulsive seizure. Questioning the applicant as to the occurrence of nocturnal enuresis may elicit a suspicion of epilepsy as this condition, when occurring in adults, is almost invariably associated with epileptic seizures. Applicants are often unaware of this significance and may admit the occurrence of enuresis while denying epileptic seizures.

Whenever an employee is found to be suffering from epilepsy, the employee should be removed from service, and the employee should be advised to seek medical attention. A diagnosis of epilepsy should be made by a physician, and the employee should be advised to seek medical attention.

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The following are the recommendations of the Committee on Epilepsy, made at its meeting on June 1, 1939, at St. Louis, Missouri:

1. Employees who are found to be suffering from epilepsy should be removed from service, and the employee should be advised to seek medical attention.
2. Employees who are found to be suffering from epilepsy should be removed from service, and the employee should be advised to seek medical attention.

1. Dr. McNeely
The Committee
on Epilepsy

Whenever a railroad employee is reported to have suffered from a sudden and unexplained attack of unconsciousness, or to have had any kind of a convulsive seizure, the employee should be temporarily removed from service and a careful investigation instituted to secure all data as to the full and exact character of the attack. Any such condition should be considered as epileptiform in character unless some very definitely positive causative factor of another nature can be ascribed.

Such employees should be removed from service or transferred to a non-hazardous occupation.

Peripheral Nerve Injuries

Injuries to the peripheral nerves play an important role in the continued disability of railroad employees following accidental injuries. Fractures of the long bones often are accompanied by nerve injuries, either complete severance or contusion of the nerve, resulting in temporary or permanent paralysis.

The two most common lesions are those of the ulnar and of the peroneal nerves; the injuries take place where the nerves are exposed at the elbow and below the head of the fibula. Nerves frequently become enmeshed in callus or scar formation, which interferes to a varying degree with their function. Interference with the function of the musculospiral nerve in fractures of the humerus resulting in the disabling "wrist drop" is a striking example. During operations for open reduction of fractures it is most important that the nerves be protected from injury. Close collaboration between neurologists and surgeons is an indispensable factor for the accomplishment of good results in the rehabilitation of these patients. While it is undoubtedly true that spontaneous cure will result in a large proportion of these injuries, it is not wise to wait too long before operative intervention. Most authorities are agreed that the effect of operation appears more promptly and reliably the earlier the intervention is performed.

Trichophytosis

Fungus infections of the skin afflict a very large proportion of the population. An examination of 3,100 freshmen in one of our large universities showed that 53.3 per cent of the men and 15.3 per cent of the women were infected upon entering the university. At the end of the year a re-examination showed 78.6 per cent of the men and 17.3 per cent of the women to be infected. A survey in a large European university recently indicated 60 per cent of the students were infected. There is no doubt that as large, if not a greater, percentage of railroad employees are similarly infected. The simple cases ordinarily will not disable sufficiently to interfere with work, but severe cases and those with serious complications are all too frequent in the practice of busy dermatologists.

The problem may be considered better by dividing into: (1) Diagnosis, (2) Occupational dermatosis and fungus diseases, (3) Treatment and (4) Prophylaxis.

1. DIAGNOSIS —

The assumption that a fungus infection is present merely because there is slight maceration between the toes has led to many difficulties. The present

4. PROPHYLAXIS—

Fungi grow best in macerated epithelial debris in the presence of heat and moisture and darkness. Therefore, cleanliness, the avoidance of heat and the promotion of dryness and ventilation are of greatest importance. The simple rule of always drying between the toes after every bath and the application of dusting powder will be of great value in prevention. Magnesium carbonate powder is one of the best for this purpose. Other factors to be remembered are the necessity for frequent baths, clean socks, dry shoes, the use of rubbing alcohol on the feet at bed time and the use of dusting powder in the morning are details of individual care of the skin surface most often involved that will go a long way toward preventing the beginning of trouble.

In addition to this type of cure the management of shower baths, locker rooms and the frequented public places blamed for the great increase in these diseases need attention. Removable lattice floors should be provided in these places, which should be exposed to sunlight daily. The treatment is always an individual problem.

Mental Disorders

There is no definite psychiatric disease or syndrome that is caused by railroad work regardless of the particular kind of work performed by the employee.

General cerebral arteriosclerosis may develop in middle life either gradually or rather quickly, and at times may be foretold by carelessness in dress, in eating, and in other habits, unpunctuality and forgetfulness, verbosity, and the recounting of things long past; also by quarrelsomeness, by childishness, by periods of drowsiness and dizziness, and physically by hand tremors, by elevation of the blood pressure or at times by lowering of the blood pressure, by stiffening of the arteries, by arcus senilis, and especially by the appearance of arteriosclerosis of the fundi. Localizing cerebral arteriosclerosis leading to apoplexy may be told by some of the above signs, especially elevated blood pressure, periods of vertigo, and in addition headache, although in certain cases premonitory symptoms may be absent.

Since the severe epidemic of influenza in this country in 1918, many cases of the various forms of encephalitis have been noticed. Railroad employees, like others, have developed this condition. After an attack of influenza the employee should be observed for lack of facial expression, for hand tremors, for stiffening of the muscles, for changes in gait, and for slowing up in movement and in alertness, and also for mental aberrations of all sorts. After any serious illness, especially from infection or injury, the conduct and the mental reactions of the employee should be watched for an insidious onset of some psychiatric condition.

A definite change in the personality of an employee is always a danger signal for the development of a possible psychosis. Thus the individual whose reactions to his fellows appear to become morose, self centered, and depressed, and who develops ideas that he has not done his full duty and is unworthy, is probably going into the depressed phase of manic depressive insanity; while on the other hand if a previously apparently normal man begins to make too many suggestions, becomes loud talking, shows elation of spirits and mental exhilaration, with a flight of ideas, he may be going into the manic phase of this condition.

Except in quite young employes the danger of dementia praecox is slight. In any event if the employe begins to get seclusive, abstracted, inattentive, slovenly, has occasional temper explosions, and has fanciful ideas he should be investigated with the possibility of dementia praecox in mind. On the other hand if his change of personality is such that he is suspicious, accusatory, feels that he is persecuted, will not listen to argument, and wants to carry his difficulties to some high authority, a trend toward the development of paranoia may be suspected.

There are other forms of nervous and mental states which might be discussed. Leaving out mention of the dangers of alcoholism, acute, periodic, or chronic, there is another danger of which we should be on the outlook and that is the mental state brought on by drug taking. Morphinism fortunately is rare among railroad and other hard working men. But what we do wish to mention is the habit of taking all sorts of the easily obtainable depression drugs of the barbital and similar groups. An employe who is found to use these drugs habitually in any excess should at first be examined and cautioned and then if he persists in their frequent use he should be removed from any potentially dangerous position.

In the handling of mental cases it is advisable to secure the assistance of a psychiatrist and also members of mental institutions in order to provide proper care and rehabilitation.

We know that we have not adequately discussed the occurrence and handling of mental conditions in railroad employes, but two things we feel certain of and on firm ground; first that we can attack these problems, with any hope of beneficial effect, only at the price of eternal vigilance; and second that we must be firm in seeing that the suspected individual is immediately withdrawn from a responsible position and put under neuro-psychiatric care.

Pneumoconiosis

Pneumoconiosis is the reaction of the lungs to the presence of any kind of dust. Silicosis is the reaction of the body, especially the lungs, to the presence of silicon dioxide, or silica, in a finely divided state. It is widespread fibrosis.

During the last few years silicosis has come to hold a prominent place in the industrial world because of legislative action. Silicosis is an old disease. Collis gives a very complete report on the literature from the time of Hippocrates up to the present. Little was written on the subject until 1717 when Ramazzini wrote his famous book "Diseased Tradesmen."

The Committee on Pneumoconiosis of the Industrial Hygiene Section of the American Public Health Association, defined silicosis as "a disease due to breathing air containing silica (SiO₂), characterized anatomically by general fibrotic changes and the development of miliary nodulation in both lungs, and clinically by shortness of breath, decreased chest expansion, lessened capacity for work, absence of fever, increased susceptibility to tuberculosis (some or all of which symptoms may be present), and by characteristic X-ray findings."

There are at least two distinct types—acute and chronic. Acute—reported as early as 1713, may develop in two years, or even less. Chronic—or most common type, takes from 10 to 15 years or more to develop.

Etiology

The primary cause of silicosis is the dust in the lung to which it is subject, in fact, the dust penetrating a dust invisible technique of dust standardized by measured in term

The probability silica dust; depend that the harmful to its quartz contents is that ranging particles readily of dust. According precisely, as there is also a factor. 1. Service, it was for limit of allowable of air for workers limit would present physical character (4) Length of dust U. S. Public Health heaviest dust, the and by four years case of silicosis

Pathology

According to Collis the disease is a type of degenerative disease, characterized by a localized fibrosis and then spreading to the lungs. The disease is characterized by an increase in size by nodules takes place

Symptoms

The disease is a description and pos

First stage: Symptoms indefinite. Man up often with recurrent

Etiology:

The primary cause of silicosis then, is free silica inhaled in the form of dust. It has been demonstrated that this dust, in order to achieve its harmful effects on the lung tissue, must be in a fine state of subdivision, that the dust particles must, in fact, be less than 10 microns in their greatest diameter. Most of the dust penetrating the alveoli is less than 5 microns in diameter. It is, therefore, a dust invisible to the naked eye, and its estimation depends on a definite technique of dust sampling and counting. This technique has been defined and standardized by the U. S. Public Health Service. Dust concentrations are measured in terms of million particles per cubic foot.

The probability of one acquiring silicosis depends upon: (1) Nature of silica dust; depends upon the mineral composition of the dust. Knopf states that the harmfulness of a quartz-containing dust usually is in direct proportion to its quartz content. (2) Size of particles of dust. Probably the most dangerous is that ranging from 2 to 5 microns, or smaller, because these impalpable particles readily remain in suspension in the air for a long time. (3) Quantity of dust. According to Loriga the quantity of dust necessary cannot be given precisely, as there is more or less individual susceptibility. Rate of respiration is also a factor. From the results of a study made by the U. S. Public Health Service, it was found practicable to suggest a tentative standard for the upper limit of allowable dustiness between 10 and 20 million particles per cubic foot of air for workers exposed to dust resulting from granite cutting. The same limit would presumably be applicable in the case of other dusts with the same physical characteristics, particularly with a quartz content of 35 per cent. (4) Length of dust exposure. In an investigation of the granite industry the U. S. Public Health Service found that in a group of workers exposed to the heaviest dust, the first case of silicosis appeared after approximately two years, and by four years all in this group seemed to have developed at least an early case of silicosis.

Pathology:

According to Gardner, silica particles smaller than 10 microns are inhaled into the alveoli and are taken up by phagocytes which carry them immediately up the lymphatic channels from one node to another towards the hilum. The special irritation of silica particles seems to enhance this movement. After locating in various nodes the irritation continues and the same type of cellular reaction occurs that is seen in tubercle formation, except the tubercle becomes caseous. The exact cause of formation of this fibrotic nodule is still in doubt. Degenerative changes then take place in these foci and the hyalin nodules increase in size by extension of their periphery, and coalescence of adjacent nodules takes place and brings about involvement of further areas of the lung.

Symptoms:

The disease is divided arbitrarily into three stages for convenience of description and possible compensation purposes.

First stage: Symptoms of uncomplicated first stage are few and often indefinite. Man apparently well, but has slight shortness of breath, dry cough, often with recurrent colds, are most usual symptoms. Earliest specific indica-

tion is the X-ray appearance, consisting of generalized arborization throughout both lung fields with more or less discrete mottling. This characteristic mottling is due to shadows cast by the discrete individual nodules of fibrous tissue in the lungs, and is essential to the diagnosis of silicosis; without this finding the diagnosis of silicosis is not sustained except by autopsy.

Second stage: Definite shortness of breath on exertion, pain in chest, dry morning cough, sometimes with vomiting and recurrent colds more frequent, dyspnea on exertion, and chest expansion noticeably decreased.

X-ray appearance:—A generalized medium sized mottling throughout both lungs. Shadows of the individual nodules are discrete and well defined on a background of fibrous arborization, but there may be some larger but limited opacities due to irregular pleural thickening or aggregation of nodules.

Third stage: Shortness of breath marked and distressing even on slight exertion. Cough is more frequent; expectoration is in most cases slight, but may be copious. Individual's capacity for work becomes seriously and permanently impaired; chest expansion is greatly decreased; loses flesh; pulse rate increased and heart may become dilated.

X-ray appearance further accentuated, mottling more intense, nodules larger, and take on conglomerate form so that large shadows are shown corresponding to areas of dense fibrosis.

Diagnosis:

For diagnosis a thorough and chronological occupational history is extremely valuable. Evidence of exposure to silica dust, or lack of such evidence, must be of significance.

The cardinal symptom of silicosis is shortness of breath, and the cardinal sign is decreased chest expansion; the earliest specific indication is the characteristic X-ray appearance. The diagnosis, however, should be made only by the correlation of all the facts, symptoms, signs, occupational history, and laboratory and X-ray observations.

In autopsy, according to McNally, any lung containing over 2 mg. of silicon dioxide per gram of dried tissue, indicates undue exposure to a dusty atmosphere.

Prognosis:

Silicosis is an incurable disease, but the prognosis in the early stages is good if the patient can be removed and placed in the open; but with the advance of the disease the prognosis becomes less favorable, principally on account of the liability of tuberculous infection.

Treatment:

Change of occupation to open air work; high, dry, warm climate best.

Prevention:

The use of various mechanical means of elimination of dust, both the formation and its removal.

Employees entering service should be questioned carefully in order to obtain complete history, especially of any exposure to silica dust; also a careful

physical examination for diagnosis.

In old cases, and if symptoms are present.

The State of effective action. The highlights of the case, as follows:

It denies "the same work" wages in other cases.

No compensation within one year of disease, except asbestos dust, day of the fact.

"Occupational" of the employee exposed outside said diseases.

A disease, apparent to the direct causal connection as a natural occurrence of the disease, as the physician must be given relation of employment or exposure, but risk is not a natural disease.

Amount of pay, \$1,000.

Amount of pay, \$1,000, and has six months from

In all other cases and surgical service thereafter, but cure from the disease his own.

(b) Temporal, \$7.50, maximum 30 days.

physical examination should be made, including X-ray film of chest for lung tissue for diagnosis and future record.

In old employees working in dust, periodical examinations should be made, and if symptoms are present, change in occupation.

The State of Illinois has passed a Workmen's Occupational Diseases Act, effective October 1, 1936, for disabilities resulting from occupational diseases. The highlights of the Act, especially as it has reference to silicosis and asbestosis, are as follows:

It defines "Disablement" as meaning disabled from earning full wages at the same work which caused the disease and with the same employer or equal wages in other employment.

No compensation payable for occupational disease unless disablement occurs within one year after the last day of the last exposure to the hazards of the disease, except in occupational disease caused by inhalation of silica dust or asbestos dust where the time limit for disablement is three years after the last day of the last exposure.

"Occupational Disease" is defined as a disease arising out of and in the course of the employment. Ordinary diseases of life to which the general public is exposed outside of the employment shall not be compensable, except where the said diseases follow as an incident of an occupational disease as defined.

A disease shall be deemed to arise out of the employment, only if there is apparent to the rational mind upon consideration of all the circumstances, a direct causal connection between the conditions under which the work is performed and the occupational disease, and which can be seen to have followed as a natural incident of the work as a result of the exposure occasioned by the nature of the employment and which can be fairly traced to the employment as the proximate cause, and which does not come from a hazard to which workmen would have been equally exposed outside of the employment. The disease must be incidental to the character of the business and not independent of the relation of employer and employee. The disease need not to have been foreseen or expected but after its contraction it must appear to have had its origin in a risk connected with the employment and to have flowed from that source as a rational consequence.

Amounts payable in case of death are: minimum \$1,000.00, and a maximum of from \$4,000.00 to \$5,500.00.

Amounts payable for disability: (a) In silicosis or asbestosis or either complicated with tuberculosis, employer must provide first aid, medical and surgical and hospital services to cure or relieve the diseases, but not exceeding six months from date of disablement.

In all other cases, the employer shall provide the necessary first aid, medical and surgical services, and all necessary medical, surgical and hospital services thereafter, limited, however to that which is reasonably required to effect a cure from the effects of the disease. The employee may in any case elect to secure his own physician, surgeon and hospital services at his own expense.

(b) Temporary total disability—after six days, compensation (minimum \$7.50, maximum \$15.00 weekly) to be paid, and retroactive to first day after 30 days.

(c) In case of total and permanent disability the maximum compensation will be the death benefit plus a pension of 8-per cent, or in certain cases 12-per cent thereafter annually for life, payable monthly.

On petition the Commission may order an autopsy by competent pathologist, where death may have been due to silica or asbestos dust. Pathologist to make complete report (including laboratory findings), but offer no conclusions.

Employees making claims for compensation must submit to physical examination, if required by employer. Employee is entitled to copy of report if he desires. If employee refuses to submit to examination, compensation ceases until such examination is made.

Employees with silicosis or asbestosis but not disabled prior to October 1, 1936, may file with industrial commission within 60 days after effective date of this act, a request to waive full compensation for disability or death from silicosis or asbestosis, or any direct result thereof, supported by satisfactory medical evidence. If the industrial commission approves such waiver the compensation payable after further exposure and resulting death or disability shall be 50 per cent of what it otherwise would have been.

Notice of disablement must be given the employer as soon as practicable. Claims for compensation must be made within six months after disablement, and applications to industrial commission for compensation within one year.

Any length of time however short is sufficient exposure to support a claim, if employee was engaged in an occupation or process in which the hazard of the disease exists—except in cases of silicosis or asbestosis where the exposure must be 60 days or more.

The employer liable shall be that one in whose employment the employee was last exposed to the hazards of the disease claimed, except for silicosis or asbestosis.

No employer shall be liable for compensation or damages under this Act in any case in which the disablement on which claim is predicated shall have occurred prior to October 1, 1936.

Chronic Arthritis

When referring to chronic arthritis we usually mean either of the two great types of chronic non-specific arthritis. In the language of the laity we speak of this as chronic rheumatism. We must not forget, however, that there are definite clinical groups of chronic arthritides of known etiology, namely toxic and tubercular. These latter are specific diseases easily recognized as a rule and if treated in the early stages of the disease processes are amenable to treatment. Numbers are cured permanently and the end results in reference to disability are not clouded by the sinister threats of the crippling, agonizingly painful and deforming onslaughts of the chronic non-specific arthritides, rheumatoid arthritis and hypertrophic arthritis.

Rheumatoid arthritis must be entirely separated from the acute disease of rheumatic fever; known also as chronic infectious arthritis, atrophic arthritis, arthritis deformans, rheumatoid arthritis is the most prevalent of these two disabling diseases. In a Cornell Clinic series of 612 cases two-thirds were of the chronic infectious, or rheumatoid arthritis type. It is most often seen in

females, in a ratio of two to one, the usual onset being at the age of 30, but is frequently seen in males.

Etiology: Hepatic lesions, predisposing factors as fatigues may bear upon some part, infection with subsequent arthritis is the actual or exciting disease. Clinical evidence of sore throat, abscessed disease will usually be followed by rheumatism.

Cecil's experiments with streptococci are known to all. His large positive joint cultures by workers through chained streptococci in in we are likely led into path.

Several workers, since Cecil, in the joints and blood of others have isolated streptococci 15 per cent. Further, some co-workers, these reported none whatsoever. They also germs were isolated from the similar to Cecil's. The Cornell Hospital in New York, diagnostic for streptococci. The workers also came from it. Some found streptococci, we are met with more rheumatism. In other words, the

The onset of the disease is gradual, and the patient is often gradually the joint begins to function in the early part of the membrane, and is continued in time over the joint, and the tissues surrounding it partial or complete ankylosis of the disease, bony ankylosis in the long bones atrophy as a gradual on-set, the disease of disease are swelling of the joints ankylosis and deformity. The disease may skip about, if fingers present the typical insig

females, in a ratio of two to one and is essentially a disease of the young, the usual on-set being at thirty five years. It is not so prevalent in tropical zones but is frequently encountered in temperate climates.

Etiology: Herein lies the settings for numberless controversies. Such predisposing factors as fatigue, trauma, shock, indigence, heredity, exposure, etc., may bear up some part, but are not convincing. That a definite focus of infection with subsequent absorption of toxins or spread of an infectious process is the actual or exciting cause is entertained by the majority of students of this disease. Clinical evidence seems to support this infectious theory. A history of sore throat, abscessed teeth, repeated boils, sinusitis or chronic kidney disease will usually be found in patients suffering with this form of chronic rheumatism.

Cecil's experiments with co-workers at the Cornell Clinic, New York, are known to all. His high percentages of positive blood cultures (66.3 per cent) and positive joint cultures (66 per cent) have not been corroborated in experiments by workers throughout the nation. Cecil found an attenuated short-chained streptococcus in his work and if we are too prone to accept this theory we are likely led to pit falls.

Several workers since Cecil have found a high percentage of streptococcus in the joints and blood of patients suffering with chronic infectious arthritis. Others have isolated streptococcus, but to a much less degree of 5 per cent to 15 per cent. Further, some workers have failed to agree with Cecil and his co-workers; these received only 1 per cent positive cultures; others found none whatsoever. They regard the streptococcus as contaminants as the germs were isolated from the culture medium in two instances using technique similar to Cecil's. In over 5,000 consecutive blood cultures at the Mt. Sinai Hospital in New York there was a yearly incidence of from five to fifteen positive for streptococcus. The type of streptococcus isolated by the various workers also carries from the attenuated hemolytic streptococcus of Cecil. Some found streptococcus viridans and even diplococci were reported. Thus we are met with unconvincing data, leaving ample room for doubt and skepticism. In other words, we do not know the cause of rheumatoid arthritis.

The on-set of rheumatoid arthritis may be sudden, or gradual, usually the latter, and the patient is first aware of pain and stiffness in a single joint. Gradually the joint begins to swell. This swelling is due to active inflammation in the various parts of the joint, especially the synovial membrane. This membrane is soon converted into a thin layer of granulation tissue that extends in time over the joint cartilage with destruction of the cartilage. The capsule and the tissues surrounding the joints are next involved and, if unchecked, partial or complete ankylosis occurs. This is a fibrous ankylosis but later in the disease a bony ankylosis may occur. Not only are the joints affected, but the long bones atrophy as do the muscles and the skin. Whether acute or gradual in on-set, the disease becomes of a chronic nature. Features of the disease are swelling of the joints, its progressive character, and the tendency to ankylosis and deformity. The knees and fingers are chiefly affected, although the disease may skip about from shoulder to elbow, wrists or spine. The fingers present the typical insignia of the disease; a fusiform swelling of the

first phalangeal joint. This is called "sausage finger." Subluxation of the joint may occur. Various other deformities such as flexion of the first phalanx and hyperextension of the terminal one. Thus, a working man is deprived of the most essential portion of his anatomy in his struggle to keep active as a wage earner.

The spine may be attacked; soon the normal curves are lost and the typical "poker" spine results. The muscles atrophy and respiration is impeded. These patients soon become poor, under-nourished and unfit. If the disease continues unchecked we sooner or later see a bed-ridden cripple with his contracted, deformed limbs and wasted muscles.

The above presents a typical case of rheumatoid arthritis running unchecked through an indefinite period of years. We do not wish you to believe that once a victim of this disease there is no escape from the disabling malady. Numbers are aided; some are cured, but still far too many show impaired joints, partially or totally disabled, and in extreme cases we are confronted by incurable cripples.

Hypertrophic arthritis, degenerative arthritis, or osteo arthritis, is the second large group of the known specific arthritides. This is usually a disease of people past middle age. Old age is given as an etiological factor, along with trauma associated with the wear and tear on the joints in men or women who for years have toiled on their feet. Obesity or overweight may add to this traumatic feature. Occupation has an important bearing. Laborers or mechanics are most often affected. Incorrect position or abnormal strain on joints and exposure seems to play a part, especially for people who lead a hard active life exposed to all types of weather. Here again we see the heavy toll that possibly can be exacted in our railroad workers. Can anyone state sincerely that railroad men do not lead a hard active life, do not have to toil at laborious work, exposed to every kind of inclement weather? Hypertrophic arthritis begins slowly and insidiously. The patient notices a slight stiffness in the affected joints which gradually become more uncomfortable and painful, especially on usage, until the pain becomes constant or more marked in the involved joint. Hips, knees, fingers and spine are chiefly affected.

Contrary to findings in rheumatoid arthritis, hypertrophic arthritis causes a definite cartilaginous destruction in the joint. The cartilage is worn away and the underlying bone is exposed. At the cartilaginous edges tipping occurs and spurs form. The joint does not swell as a rule and the joint cavity is never obliterated. No synovial adhesions form and ankylosis does not occur, but a certain amount of locking may follow the outgrowing of bony spurs. Typical findings in hypertrophic arthritis are the Heberden's nodes—a tiny bony outgrowth appearing at the bases of the terminal phalanges.

Thus again we see a disabling disease that by its pain producing ability and by limiting activity through mechanical locking of useful joints, robs numbers of skilled workmen and laborers of their ability to perform their tasks capably and in some eventually causes cessation of all wage earning activities.

After this brief summary of these two disabling ailments we must now consider the ideas advanced by many students that both are only different phenomena of one disease. Much evidence supports this theory.

Number of patients. Some present the form of chronic arthritis in a mixed arthritis in a an X-ray study of reaction in the joint.

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Pemberton, in his t two great types of art from the other. Year were two distinct an caused by the same arthritis, whatever th

Whether we separa know that the diseas dies go by we learn t

What then for trea the subject since the i nents prescribed and treatment to date. I dried, thyroid gland, Spring waters, vacana sunshine, dieting, medicines and baid t today offer any great cious forms of them to offer the best pho three or four months t

What then can we c gressed over six mont tensids, will cause a per smaller number. Tha similar to the progress ankylosis in spite of t most wise to clear up a treat the patient and r all abnormalities, and c

What Archer terms pedic procedures, first. (2) Physical therapy n climatic change from th

Numbers of patients are seen with insignia of both diseases at the same time. Some present the fusiform swelling of rheumatoid arthritis in one finger and the next digit will show a typical Heberden's node. There is definitely a mixed form of chronic arthritis. Archer, of New York City, reports fifty instances of mixed arthritis in a series of 1,459 cases of chronic arthritis. Recently Rigla, in an X-ray study of sixty cases, found that two-thirds showed a mixed type of reaction in the joints.

Often we see a middle aged individual with what we term rheumatoid arthritis develop as he grows older the typical signs of hypertrophic arthritis.

The blood picture in the two diseases offers very little. In rheumatoid arthritis there may be a mild anemia. Patients in both groups may run a slight leukocytosis. The urine is essentially negative. Thus, again we see a similarity in the chronic non-specific arthritides.

Pemberton, in his text book, states that whatever the criteria we accept, the two great types of arthritis cannot definitely and finally be wholly divided one from the other. Years ago we thought the primary chancre and tabes dorsalis were two distinct and separate disease entities. Today we know they are caused by the same organisms attacking in a different way. Thus chronic arthritis, whatever the etiology may be, can surely cause dissimilar end results.

Whether we separate the arthritic types or not is of little consequence. We know that the disease of chronic rheumatism is quite prevalent and that as days go by we learn none too much about its etiology.

What then for treatment? One need only peruse text books and papers on the subject since the disease was known to find that countless drugs and treatments prescribed and, as frequently changed, denotes a certain futility in the treatment to date. Physicians have used iodides in various forms, guaiacol, dried thymus gland, thyroid, arsenic, sulphur, and of course salicylates. Spring waters, vaccines, foreign proteins, diets, liniments, physiotherapy, rest, sunshine, diathermy, electricity, colonic irrigations, and countless other medicines and fads have been tested. And none of these listed treatments today offer any great cause for rejoicing. Sufferers are relieved by the above various forms of therapy but as a rule this relief is temporary. Vaccines seem to offer the best plan of attack, but now Cecil states that he tries vaccines for three or four months and if it fails to help he stops this therapy.

What then can we do? In the early cases in which the disease has not progressed over six months the removal of a focus of infection, especially the tonsils, will cause a remission in a large percentage of the cases and a cure in a smaller number. This may make us doubt whether these early cases are similar to the progressive arthritis that goes inexorably to bony deformity and ankylosis in spite of the removal of foci. However, early in the disease, it is most wise to clear up all possible infectious foci. Once a case of advanced we treat the patient and not the disease. We study each case carefully, correct all abnormalities, and observe the effects on the course of the disease.

What Archer terms as reasonable measures of treatment are: (1) Orthopedic procedures, first to combat and secondly to overcome joint deformity. (2) Physical therapy in approved forms. (3) Drugs to relieve pain. (4) A climatic change from the humid and cold north to the warm and dry south.

Surgery offers little but resection of ankylosed joints with resultant shortening and no relief of ankylosis, but in most cases relief from pain. Patients so benefitted still must be handicapped by a stiff joint a curse, indeed, to the laboring man dependent upon his physical ability to insure a job.

Compilation of figures in our Railroad Hospital are not at hand, but far too often are we visited in our clinics and hospitals by patients suffering with chronic non-specific arthritis. We ferret out the foci of infection, take the affected joints, use salicylates for the pain, and lately have tried the new sulphur preparations. Relief is obtained but it is discouraging to see these same patients return repeatedly sooner or later for help—help we willingly try to bestow, reserving for our own contemplation the final scene when these strong, willing, supporters of families must acknowledge defeat and become reconciled to a painful existence disabled for duty.

Thus, the more we pause to consider chronic arthritis, the more we view with dread the insidious onslaught of rheumatoid arthritis and hypertrophic arthritis, diseases of which we know so little as to etiology and means of treatment, and diseases which at this writing continue to be the "bugaboo" of physicians the world over.

Respectfully submitted,
COMMITTEE ON DISABILITY AND REHABILITATION,
J. D. COLLINS, Chairman.

THE CHAIRMAN: The report of the committee is now open for discussion.
... Upon motion regularly made and seconded it was voted that the report be accepted as a progress report. ...

THE CHAIRMAN: It now gives me pleasure to introduce Dr. Thomas M. McMillan, Associate Professor of Cardiology, of the Graduate School of Medicine of the University of Pennsylvania, who will speak on "The Heart in Industry."

DR. THOMAS M. McMILLAN: Mr. Chairman: I first wish to express my appreciation to you for asking me to be with you today. In the second place, I want to say that I am not at all certain that I am entirely fitted to discuss the subject of "The Heart in Industry," because, although I come in contact with a good deal of heart disease in my day's work, I am not particularly associated with the heart as it occurs in industry. However, on thinking over the matter I have decided that, after all, the heart in industry isn't very different from the heart in general medicine. So I have persuaded myself to attempt to discuss this matter as well as I can.

I am fully aware that the heart isn't your only problem. You are equally concerned with the other systems and organs of the body, but today, in order to make our discussion orderly and systematic, we will omit all other phases of disease and consider only the heart.

As I visualize the duty of the medical department of a great industry, it is, first of all, to determine that an individual's heart is able to perform the job

given him without one of the questions. The product of the job as individual plants to figure has heart organizations have a

Your work, as I see it, is diagnostic, and for this with the diagnostic feat

Customarily, an opinion thing: first, the symptom information furnished by cases, are handicapped, imagine, the symptoms, wishes to go on with his cordial pain when, as a seems to me you may information given by a ki and that you must be studying the heart.

I want to say first a little in deciding whether a heart an etiology approach to a disease is not something it has a cause, that these in discovering the presence of in itself, or, in its evidence.

Let us now consider (Slide) I have placed on I know of. Actually when I had been, many of them on the grounds of their heart

(1) Acute pericarditis. I see it frequently. In the finite disease, such as the recognition of the fact that disease in which my condition or demonstrable cause. In infectious myocarditis. The pneumonia, diphtheria and a problem. Bacterial endocarditis is common. This really is not heart disease; for bacterial only in those already diseased easy to recognize when it exists very conspicuous murmurs. common. When they exist the

given him without endangering the safety of others. But that is only one side of the question. There is another very definite duty, and though it is a product of rather recent developments, it is none the less a real one. Your job as industrial physicians is also to see that the job you give a man to do does not injure his heart or his health. For both of these duties our industrial organizations have a moral and a legal responsibility.

Your work, as I see it, therefore, as far as the heart is concerned, is largely diagnostic, and for this reason what I have to say will be concerned mainly with the diagnostic features of heart disease.

Customarily, an opinion on a heart is based upon a consideration of three things: first, the symptoms; second, the physical findings; and third, the information furnished by certain graphic studies. You, like insurance physicians, are handicapped by having to discount to a great extent, I should imagine, the symptoms. A man, for instance, doesn't wish to be retired. He wishes to go on with his work, and he may deliberately tell you he has no precordial pain when, as a matter of fact, he may have precordial pains. So it seems to me you may just as well make up your mind that the valuable information given by a knowledge of the symptoms will have to be given up, and that you must come to rely more and more upon other methods of studying the heart.

I want to say first a little bit about one method that helps greatly, I think, in deciding whether a heart is normal or abnormal; this is what may be called an etiologic approach to heart disease. This consists in recognizing that heart disease is not something mysterious, but that every instance of heart disease has a cause; that these causes of heart disease are not numerous, and that discovering the presence or absence of an adequate cause for heart disease may in itself constitute evidence for or against the existence of the heart disease.

Let us briefly consider the causes of heart disease.

(Slide) I have placed on this first slide all the causes of heart disease that I know of. Actually when we come to consider various headings that I have listed here, many of them are found to be extremely rare, and may be ignored on the grounds of their rarity.

(1) **Acute pericarditis.** All types of this condition are rare: one doesn't see it frequently. In the second place it occurs in association with some definite disease such as rheumatic fever, tuberculosis, uremia, etc., and its recognition is thus facilitated. **Idiopathic myocarditis:** This is a rare form of disease in which myocardial change of severe form occurs without recognizable or demonstratable cause. It is extremely uncommon. The same with **Acute infectious myocarditis.** This occasionally develops with diseases such as pneumonia, diphtheria and typhoid. I doubt if this will ever become your problem. **Bacterial endocarditis.** The streptococcic form is the only one that is common. This really is not a cause of heart disease: it is a complication of heart disease; for bacterial endocarditis does not occur in healthy hearts but only in those already diseased. **Congenital heart disease.** This is rare, and easy to recognize when it exists because of the fact that it is accompanied by very conspicuous murmurs. **Thyroidal heart disease.** These are not very common. When they exist their recognition should not be difficult. They will

be correctly diagnosed if one recognizes the existence of hypo or hyperthyroidism.

The remaining four are the common forms and types of heart disease, and these four—hypertension, coronary arteriosclerosis, rheumatic fever, and luetic diseases—will account for 95 per cent of all the heart disease that comes before us. Therefore we should all have in mind that those first four etiologies are the main causes of heart disease.

Now, each of these four great types of heart disease—hypertensive, arteriosclerotic, rheumatic, and luetic—presents a very distinctive picture. There are no two of them exactly alike. Each one has a pretty definite course, and if we understand these four types, and know their life histories, so to speak, and are able to recognize these four types of heart disease when they exist, we come pretty close to knowing about all there is to know of heart disease.

We can't consider these types of heart disease in any detail. The luetic and rheumatic forms are usually quite easy to recognize. Both have a predilection for certain age groups. Both cause conspicuous valve lesion, the luetic producing aortic insufficiency, and the rheumatic, mitral stenosis alone or associated with aortic insufficiency. They therefore offer no particular diagnostic problem, as a rule.

And so with hypertension. The hypertensive hearts are of course accompanied by hypertension and are therefore easy to recognize.

But the fourth form, the arteriosclerotic, is not so easy to recognize. This is a form of heart disease that is very insidious in its development. I am not referring to the sudden acute occlusion of a coronary artery, but I am referring to the gradually developing coronary arteriosclerotic changes that narrow the coronary arteries slowly but progressively, and thus diminish the blood supply to the muscle and cause certain small areas of the muscle to die.

I should say that the arteriosclerotic type of heart disease should be of particular interest to you; for a great deal of coronary arteriosclerosis may take place before definite abnormal physical signs appear. The early stages of coronary arteriosclerotic heart disease, are signaled by symptoms alone, and these symptoms, I think, you will usually not be told of. Such symptoms as unaccustomed breathlessness, vague indigestions, undue palpitation, oppression in the chest after exercise, or following excitement, or after eating; later perhaps frank anginal pain. All of these vitally important symptoms may exist for a considerable time before there are any recognizable physical signs, and you, in your work as railroad physicians, will not know of the existence of these symptoms very often, I feel sure.

Yet it is most essential that you should recognize the existence of arteriosclerotic heart disease; for it is precisely the type of coronary arteries associated with these hearts that are so prone to develop an acute thrombosis; an event which in many railroad employees might result in an extremely tragic result.

How, then, are you to recognize the existence of early coronary arteriosclerosis when you are deprived of a reliable history, and when there are, as yet, no definite physical signs?

Your problem in the physicians. They like going to recommend to application of graphic the electrocardiograph within five years no case of 45 years of age whose heart shows no electrocardiogram.

No one can translate sustain if certain employment companies are unwilling to pay for X-rays, you too should be done all that it is possible to do all that is possible cardiographically and roentgenographically.

I do not wish to be in graphic methods will show evidence of potentially fatal they will not. They will number of patients, and applying.

I should now like to devote some time to the importance of the diagnosis.

The first is asthma. Of importance to you is the fact that coronary difficulties are often a part of the picture. Therefore, when we find a heart, as a rule it is not the true asthma. I am only indicating that the picture of asthma often does. The picture is heavy abnormal present in the family. Of course, the picture of asthma often does.

The second symptom is indigestion. It is often an early sign of the disease. I would like to give you one way to his office was seized into partial collapse. Some hospital with which I am acquainted with clinical signs of coronary occlusion. The point I want to make is that before this coronary occlusion had been to one doctor including the gall bladder and

Your problem in this connection is very similar to that faced by insurance physicians. They likewise are not told of symptoms very often, and I am going to recommend to you the course they have followed: namely, a wide application of graphic methods of cardiac study; specifically a broad use of the electrocardiograph and the X-ray. I think I am safe in predicting that within five years no insurance company will risk as much as \$25,000 on a person of 45 years of age or over, without first assuring themselves that that person's heart shows no electrographic or X-ray evidence of cardiac abnormality.

No one can translate into dollars and cents the loss that a railroad might sustain if certain employees might develop at some critical moment, let us say, a fatal or incapacitating coronary occlusion. But I feel sure that if the insurance companies are unwilling to risk \$25,000 without electrocardiographs and X-rays, you too should be unwilling to take the risk involved without having done all that it is possible for you to do to look for and to recognize any foreseeable cardiac defect in any of your vital employees, and you will not have done all that is possible until you have studied all persons over 45, electrocardiographically and roentgenologically.

I do not wish to be misunderstood. I am not meaning to say that these graphic methods will show the existence of early cardiac trouble or reveal evidence of potentially bad coronary arteries in all instances. Emphatically they will not. They will, however, reveal these defects in a considerable number of patients, and these, it seems to me, make the methods worth applying.

I should now like to discuss certain signs and symptoms that have importance often in the diagnosis of heart disease.

The first is asthma. Ordinary allergic asthma, I presume is not of great importance to you. But many persons will frequently interpret certain respiratory difficulties as asthma, which, in reality are paroxysms of cardiac dyspnea. Therefore, when we obtain a history of asthma, we should always consider the heart. As a rule it is not difficult to differentiate between cardiac dyspnea and true asthma. I can only mention two points that may help. One is the duration. Cardiac dyspnea resembling asthma does not last for years. Allergic asthma often does. The second point is the familial incidence. True allergy is nearly always present in some form or other in more than one member of a family. Of course cardiac dyspnea rarely is.

The second symptom I want to take up is **indigestion**. Vague, indefinite indigestion is often an early symptom of arteriosclerotic heart disease. It may be present before there are any recognizable physical signs of heart disease. I would like to give you one example. Not long ago a busy executive on his way to his office was seized with this sudden agonizing chest pain and went into partial collapse. Some friends got him into a taxi and rushed him to a hospital with which I am connected. When I saw him he presented all the clinical signs of coronary occlusion, which was proven by the electrocardiograph. The point I want to emphasize in this case is this: For five years before this coronary occlusion, this man had had vague, atypical indigestion. He had been to one doctor after another for this. His gastro intestinal tract including the gall bladder and the colon were carefully studied clinically and

by X-ray and always with negative results. Yet he persisted in having indigestion until it finally culminated in an acute episode. At the end it was plain enough that his indigestion was simply a manifestation of the coronary artery disease, yet during five years there were no clinical signs evident of heart disease.

So I say vague, atypical indigestion should be looked upon with suspicion.

I want to say a word about **systolic murmurs**. We all know that many entirely undiseased hearts present murmurs. On the contrary, murmurs may be a definite evidence of disease. How shall we determine when a murmur means disease and when it doesn't? It seems hardly fair to debar a man from earning his livelihood simply because there happens to be a murmur if his heart is perfectly sound.

I believe that we will not go far astray if we adopt in industrial medicine the attitude of modern cardiology: namely, a systolic murmur can be overlooked if there are no symptoms, no known etiology and if the heart is entirely normal by X-ray and by electrocardiographic study. In my own experience I do not believe I go astray very often in following this rule.

Now, we must not have any rule that is too rigid. There are some instances where a systolic murmur is loud or rough or has some peculiar quality that our clinical judgment tells us we should not ignore even if in every other way the heart appears normal. We do not ignore systolic murmurs, for instance, if they are accompanied by definite thrills. But the point I want to make—I can't go into this in any detail—is that many systolic murmurs are perfectly harmless, meaningless phenomena and can be entirely safely passed over.

Next I would like to say a word about **arrhythmias**. I imagine this is a problem you have to consider. These are difficult to interpret and know the meaning of because in many instances they occur in normal undiseased hearts. How shall you interpret extra systoles? I believe that we can follow the practice of the insurance physician again and regard extra systoles as of no great importance if all other features of the heart examination are negative, and if the extra systoles are occasional and not too frequent. If they are too frequent I do not think that you will be justified in ignoring them, for this reason: Many forms of paroxysmal tachycardia are simply a series of extra systoles, and when these isolated extra systoles occur frequently it is not uncommon for them to lead to paroxysmal tachycardia.

Now, there are some forms of paroxysmal tachycardia that occur frequently in entirely normal hearts. This is notably the case with the auricular tachycardia, the commonest type. I have a patient who is 76, and she tells me she has had paroxysmal tachycardia ever since she was a girl. I think you should bear this point in mind: Although these paroxysms of tachycardia do not necessarily indicate that there is any organic disease, they may greatly disturb the circulation, and not infrequently cause severe attacks of giddiness and even fainting. This is particularly the case when paroxysmal tachycardia develops in older individuals.

I will not have time to discuss the various types of paroxysmal tachycardia, but I am going to show you one slide of one type that I think might be of some interest. (Slide) This is auricular flutter in which the ventricles do not re-

spond as they should. This disturbs the conduction into the ventricles and produces irregularities between the heart and the lungs.

There are, in a contracted industry, certain

Now, cardiac murmurs. Every total character that is being detected by pl only by X-ray, conduction in certain cases.

I always like London cardiac, the heart and electrocardiographic X-ray.

For instance, examining the medical aspect of the heart, I don't think it is perfect.

Now, hypertensive heart. It is the cause of hypertension of heart. There are two contraindications.

The diagnosis, however, most should be carefully made.

What about danger mark? physical examination, orthodiagnosis with a blood pressure provision even when they

spond as they usually do to every second auricular beat, but to every beat. This disturbance gives us the most rapid hearts that we know of. In this case the ventricular rate is 260 per minute. When the ventricle is beating 360 a minute the diastole is so short that the ventricles do not have time to fill properly and the circulation as a result may be considerably disturbed. In this particular case we could discover nothing abnormal in the heart or circulation between these attacks. But when the paroxysms set in the patient quickly lost consciousness. This would not be a good thing to have happen to an engineer.

Therefore, in my opinion, you should look upon paroxysmal tachycardia as a contraindicating employment in many of the vital jobs in the railroad industry, certainly when it occurs in individuals who are 45 or 50 years of age.

Now, **cardiac enlargement.** We all know the importance of cardiac enlargement. Every heart that is at all enlarged is abnormal. By clinical percussion and palpation are the only methods available for detecting an increase in the total diameter of the heart. I wish to emphasize that there are many hearts that are enlarged in which the total diameter is not increased. These cannot be detected by physical examination. They have to be discovered by X-ray and only by X-ray, for this method gives us not only a measurement of the heart in centimeters but it reveals certain characteristic shapes, or enlargement of certain chambers that you can't demonstrate by percussion.

I always like to quote a statement I heard Sir Thomas Lewis, the great London cardiologist make: "If I could retain only one method of examining the heart and had to choose between palpation, percussion, auscultation, electrocardiography and roentgenoscopy, I would without hesitation choose the X-ray."

Fortunately we do not have to limit ourselves to the use of one method in examining the heart. We can use all methods. No examination can be called really complete unless we have included in that examination the X-ray. The more I use it, the more I am convinced that of all the methods of studying the heart it is perhaps the most valuable.

Now, **hypertension.** Unquestionably hypertension seriously damages the heart. It is the heart that fails and causes death in at least fifty per cent of all cases of hypertension. Christian has stated that hypertension is the chief cause of heart disease. I think most of us will agree with that statement. Therefore to you in your particular work hypertension is to be looked upon as a contraindication in most of your employees.

The difficulty lies in saying what blood pressure reading constitutes hypertension. Most insurance companies say anything over 140-90 is abnormal. Should this particular reading, 140-90, be looked upon as dangerous? I hardly think so, provided that the heart is normal in all other particulars.

What about a systolic pressure of 160? Shall we look upon that as the danger mark? The answer to that I suppose would be qualified. If the physical examination is entirely negative, if the electrocardiograph and the orthodiagram are negative, and if there are no symptoms, perhaps an individual with a blood pressure of 160 might safely do his work. The catch lies in the latter provision. I doubt if you will often discover symptoms in such patients even when they exist.

Now, I have chosen the blood pressure reading of 160 to discuss because it happens to be the reading in two railroad engineers that have come to my attention. Let me briefly review their cases.

The first, a man in his early sixties, was referred to a physician in Philadelphia who specializes in allergy, because of what was thought to be asthma. This allergist, finding his blood pressure to be 160 and finding his heart by clinical examination to be on the borderline of enlargement—he suspected that his attacks of dyspnea might be cardiac and referred him to me for cardiac study.

This engineer gave me the history of severe attacks of angina pectoris. He had not, however, revealed the existence of these attacks to the railroad physician who last examined him. I found his heart by X-ray to be definitely enlarged. The T waves in Lead I of the electrocardiograph were deeply inverted. The picture was clearly one of grave heart disease, and yet that man was running a passenger engine.

I debated seriously whether I should inform the railroad of my findings, and finally decided to hand the responsibility to the physician who referred him to me. I was very relieved to learn later that with the patient's consent the railroad was informed of the man's condition and he was retired. To me that was a very impressive example of how you are handicapped by lack of symptoms. This man didn't want to give up his job. He told none of you that he was having severe seizures of angina.

The information regarding the second engineer which came to my attention has come to me most indirectly. But as I had the story the patient, who was in his fifties, had just completed a run and was preparing to take his engine out of the terminal when he suddenly developed a coronary occlusion and subsequently threw off an embolus to the brain. There is some uncertainty in my indirect information as to whether he had the coronary occlusion first, but that is unimportant. The point I wish to emphasize is that this man gave a history to his private doctor of having a blood pressure of 160 (which of course was probably known by the railroad physician) and he also gave a history of having had for some time previously severe attacks of angina pectoris. These the railroad physician had no information concerning.

Therefore I should say to you that even a mild hypertension—both of these men had a blood pressure of only 160—often is accompanied by severe symptoms of which you often will not be aware, and it should therefore always be looked upon with suspicion. If you were sure there were no symptoms perhaps you could disregard mild hypertension, but I don't believe you can be sure.

Now, the last thing I want to discuss is age. There is some age beyond which the heart on the mere ground of age alone must be regarded as incapable of hazardous work. What that age is I am not prepared to say. However, as we have watched the development of coronary occlusion in recent years we are convinced that the average age of its development is becoming steadily lower. A few years ago the average age was put at 57, then at 55; now, more recently, at something like 52. With this in mind I am sure that there are not many individuals over 70 who have not at least potential coronary trouble. Don't

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misunderstand me. There are some. But in selecting these I feel that you must exercise great care.

So far as I can judge by the facts available to me you have exercised great care, and I congratulate you; for I think the number of serious cardiac accidents to railroad employes must be very low.

In closing, I would like to say that it seems to me that any or all of the factors we have been discussing, namely murmurs, arrhythmias, hypertension even when it is mild, suspected cardiac enlargement, atypical indigestion, asthma, and many others that we haven't discussed—any or all of these symptoms or signs should cause you to be particularly careful and make you want to secure all the cardiac information possible. They call for not only careful physical examination but for X-ray and electrocardiograph studies as well. Any or all of these symptoms or signs are to be regarded with particular suspicion in persons over 45. Insurance companies will not risk as much as \$25,000 on a person of such age without having these graphic studies. I don't mean to say that you ought to either. (Applause.)

TIM CHAMMAN. Dr. McMillan, your address has been both interesting and instructive and we thank you for the trouble you have gone to.

We will now hear the report of the Committee on Developments Resulting from Physical Examination, by Dr. Ide.

Dr. A. W. Ide read the printed report of the Committee on Developments Resulting from Physical Examination.