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16. Abstract

An annotated bibliography of translations of foreign-language articles is presented. Of the 86 listed entries, 53 are concerned with studies of shift work, and 10 are concerned with studies of alcohol. The remaining entries can be subsumed under the following descriptions: sickle cell anemia, exogenous and endogenous components of sleep and wakefulness, use of barbituric acid in photometric determination, high-speed magnified cardiography, data on age characteristics of the female pelvis, tolerance of contact lenses by commercial flight crews, accidents and sickness in coal mines, attitudes toward work and working conditions among air traffic control personnel, pilot landing performance and amount of visual information, use of human bones and hair in forensic identification, motor reaction time to acoustic stimuli, anthropological methods, cupulo-endolymphatic reactions to head turning under natural conditions and in rotation, and expert testimony in aircraft accident investigation. Procedures for obtaining copies of the translations are included.

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FOREWORD

This annotated bibliography of recently translated, selected research papers is presented as a scientific service of the Civil Aeromedical Institute. The aims of the publication are (a) to provide interested researchers with information concerning translations of foreign-language articles as soon as the translations are available and (b) to prevent duplication of translation costs and efforts.

In achieving these aims, bibliographic listings such as the present one are necessarily limited in number. They are also limited by the range of activities represented in the agency preparing the material. Thus, selective factors exist. Further, no attempt is made to evaluate the scientific worth of a given article. By providing a central repository from which such translated material can be obtained, however, we hope that interested scientists will derive otherwise unavailable benefits.

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AVIATION MEDICINE TRANSLATIONS: ANNOTATED BIBLIOGRAPHY OF RECENTLY TRANSLATED MATERIAL. X.

Agdal, N., and M. T. Andersen.

Seglcelleanaemi med dødelig udgang under lufttransport. (Death from sickle cell anemia during air transport.) Ugeskrift for Laeger (Copenhagen), 138(10): 597-599, 1976.

The death of a 5-year old Gambian girl from sickle cell anemia in an airliner during a flight from Accra to Kastrup is presented. Sickle cell anemia is reviewed, and special emphasis is put on the sickle cell anemia crisis and the pathologico-anatomical findings. The risk involved in transporting such patients by airliners is discussed.

Andersen, J. E.

Følgerne af skifteholdsarbejde. (Consequences of shift work.) Medical Society of Copenhagen, Meeting No. 1380, April 28, 1959.

An investigation of the effects of shift work to determine (i) the extent and organization of shift work and (ii) the possible influence of shifting working hours on health and social life was presented by the author at the Medical Society of Copenhagen in April 1959. This study involved 900 workers (300 doing daytime work; 600 employed on three other shifts). Difficulties with sleeping were reported by 66 percent of the shift workers and 11 percent of those in daytime work; 64 percent and 25 percent of shift and daytime workers, respectively, had nervous complaints. Family life was affected by shift work although the frequency of divorce was no greater among shift workers than among daytime workers. The shifting working hours interfered with participation in regular activities during free time and, for approximately half of the shift workers, had a hampering influence on free-time occupations.

The author points out the following possibilities as ways of countering the effects of shift work by controlling conditions: changing the placement of working hours in the 24-hour period, changing the duration of the shift period, selection of suitable people, and instruction in the conduct of life (eating habits, etc.).

Andlauer, P.

Différentes modalités du travail en équipes alternantes. (Different modalities of work with alternating shifts.) Archives des Maladies Professionnelles (France), 32:393-395, 1971.

This study deals with workers involved in rotating teams (N = 543 for 7-day rotations; N = 516 for 2-day rotations) in three types of French industries--metal-working, chemistry, and artificial textiles. After comparing the pathological manifestations in the two kinds of work rotation studied, the author concludes that he favors shift-changing every 2 days. The data indicate that 45 percent of the workers showed intolerance in the 7-day alternation; only 34 percent did so in the 2-day alternation. Moreover, no adaptation of the variation of body temperatures to the changes in lifestyle under either alternation was found.

Andlauer, P., and L. Fourre.

Étude de la nuisance comparée de deux modalités d'alternance. (Shift work: Study of comparative harmful effects of two methods of rotating shifts.) Revue Francaise du Travail (France), 19:35-50, 1965.

This paper presents a comparative study of the two rotation methods most frequently used in French industry (changing shifts every 2 days and changing shifts every 7 days). The first phase of the study was a medical survey designed to compare the respective pathological effects of the two rotation methods. The second phase was an on-the-job survey for both rotations conducted during three shifts (morning, evening, and night) and dealing with the body temperature of samples of workers selected from those in good health and also from those with pathological disorders. Results led the authors to conclude in favor of the 2-day rotation.

Aschoff, J.

Exogene und endogene komponente der 24-stunden-periodik bei tier und mensch. (Exogenous and endogenous components of the sleep and wakefulness period in man and animal.) Die Naturwissenschaften (German), 21:569-575, 1955.

The 24-hour cycle in man and animal is based on an inborn endogenous component which is demonstrable upon exclusion of all external control factors as an "inherent frequency" of variously long periodicity. The frequency is governed by the type of animal (diurnal, nocturnal) and the selected constant environmental conditions (constant light, constant darkness). The inborn endogenous component prescribes a certain type of cycle (bigeminy) which cannot be varied arbitrarily through external influences and, in addition, it limits the possibilities for a passive frequency modulation.

The phase position of the animal 24-hour cycle is determined exclusively by known environmental stimuli--the physical-chemical and sociologic master clocks. Through appropriate manipulation of these master clocks, any phase shift can be obtained. For sudden adjustment of the master clocks by 180° (inversion test), the animal phase follows slowly; complete synchronization is attained after an average of 8 days. If the known master clocks are excluded, then the frequency of the animal cycle changes. The assumption of an unknown terrestrial or "cosmic" factor which binds the phase to the local time is unfounded.

Man reacts to physical-chemical environmental forces in a manner not basically different from the animal. If the inversion of his cycle is incomplete or absent in an experiment, this may be due to the following causes: (i) the reversal of master clocks is more or less incomplete, (ii) the significance of sociologic-psychologic master clocks is undervalued; they can only be excluded at considerable effort, and (iii) knowledge of the correct time of day is sufficient to impede the inversion even if condition (i) is fully met. Points (ii) and (iii) which are based on conscious processes are the reason that man--in contrast to all animals--seems to be bound to an extraordinary extent to the local time. The assumption of an unknown control factor is not needed to explain this peculiarity. If, in the future, additional daily-cyclic, meteorologic quantities beyond the 40 already known, should be discovered, then they will merely be added to the others of which the light-darkness alternation is by far the most significant.

Asmus, E., and H. Garschagen.

Über die verwendung der barbitursäure für die photometrische bestimmung von cyanid und rhodanid. (On the use of barbituric acid in the photometric determination of cyanide and thiocyanate.) Zeitschrift Fuer Analytische Chemie (German), 138:414-422, 1953.

A photometric cyanide and thiocyanate determination method in water, based on the Zincke-Koenig reaction, is described. However, instead of a primary aromatic amine, barbituric acid is used to obtain a polymethyne dye. With the aid of this new method, cyanide contents in the range from 1 µg/L to 1 mg/L and thiocyanate contents in the range from 1 µg/L to 2.5 mg/L can be determined with a Leitz compensating photometer or a Zeiss-Opton "Elko II," in aqueous solution of pH 2-10.

Azuma, M., C. Umezono, and M. Ichitani.

拡大高速記録心電図について

——主として高域遮断周波数の影響について——

(High speed magnified cardiography with special reference to the influence of high cut frequency on the P wave.) Bulletin of Chest Research Institute, Kyoto University (Japan), 6:122-125, 1973.

The expanded high-speed recording electrocardiograph that the authors fabricated is described. Measurements of the P wave and the T-a wave are greatly facilitated, working at 16 times the standard sensitivity and at a recording speed of 100 mm/sec. The authors suggest that it is preferable to work at a high region cutoff frequency close to 60-90 Hz to facilitate the analysis of the wave form of the P wave and trace the fine changes in the P wave.

Bablik, V. L.

Experimentelle untersuchungen über den einfluB von alkohol auf das normale gehör. (Experimental studies on the influence of alcohol on normal hearing.) Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie (German), 102:305-319, 1968.

In 200 tests on 145 persons the influence of acute alcoholization on hearing was investigated. It was found that the hearing of pure tones was not impaired even by higher alcoholization. Also hearing-fatigue was not changed. On the other hand, the understanding of numbers and words was significantly reduced under the influence of alcohol. This reduction depended on the degree of the alcoholization and was more marked on words than on numbers.

Barhad, B., and M. Pafnote.

Contributions a l'étude du travail en équipes alternantes. (Contributions to the study of rotating shift work.) Le Travail Humain (France), 33(1-2):1-20, 1970.

Studies on shift work adaptation in connection with rotating shift systems and the characteristics of work are presented. They include frequent rotation of work

shifts, every 2 days (2-2-2 system) in control board operators of thermopower plants; weekly rotations with 3 days of rest at the end of the working cycle (6-6-6 system) in operators of an oil refinery; weekly turning of shifts with Sunday rest in forgers (medium intensity of physical effort) and in precision toolroom workers (perceptual tasks); in miners (hard physical effort), and in operators of tire-assembling machines (perceptual and physical strain).

Investigations of reaction time, optic rheobase, tests of attention, pulse rate, energy exchange during work and rest, and social and opinion inquiries showed the characteristics of physiological responses during the work in the three shifts (morning, afternoon, and night shifts) as well as adaptation features to different intervals of changing the shifts. The type of activity, the level of physiological strain, and social factors seem to have a more pronounced influence on adaptation to shift work than the actual rotating schedule.

Barhad, B., and M. Pafnote.

Contributions a l'étude du travail en équipes alternantes. (Contributions to the study of rotating shift work.) Le Travail Humain (France), 3:84-107, 1970.

Data are presented from studies of problems of rotating shift work with studies of the reactivity of the body at various periods during the day, characteristics of fatigue, labor capacity, effects on personal life, and views of workers concerning labor assignments, state of health, rest and sleep time, and leisure time. Studies involved automated and semi-automatic labor processes with a frequent rotation schedule. The authors conclude (i) the nature of activity and level and nature of the demands made on the body during work seem to have a more important influence on adaptation to night work than the shift-rotation system; (ii) among the physiological functions studied, pulse rate was the most stable and the most difficult to alter with a change in the work cycle; (iii) attention should be devoted to measures to reduce neuropsychological demands and emotional tension by a proper work and rest schedule; and (iv) medical measures involving selection of personnel and a study of adaptation by means of constant supervision should be regarded as obligatory.

Bast, G. H.

Ploegenarbeid in de industrie, Verslag van het sociologische deel van een onderzoek. (Shift work in industry, report on the sociological part of a study.) Contact Group for Productivity Increase, Van Loghum Slaterus/Arnhem (Dutch), pp. 165-275, 1960.

This is a report on the sociological part of a more extensive study of shift work in industry. An overall picture of the methods used for the main study are presented with illustrated examples. The author's aim was to isolate the independent variable in the relationship (influence of shift rhythm), determine other (sociological) variables which play a conditioning role, and determine the relative importance of the shift rhythms and the sociological variables in the relationship. Copies of six questionnaires are included.

Benitte, A. C., and R. Lefebvre.

L'inversion du rythme nycthéméral ses conséquences physiopathologiques. (Inversion attributable to nychthemeral rhythm, its physiopathological consequences.) Presse Medicale (France), 69:2459-2460, 1961.

Vital phenomena are divided into irreversible phenomena and cyclic phenomena. Usually, activity is put into motion by the alternations of day and night. This alternation is not innate: in the newborn infant, rhythm is polyphasic; towards 5-6 years of age, the adult's monophasic rhythm sets in and it is difficult to interrupt it. Rhythm interruptions in monkeys bring about the appearance of neuroses. In man, adjustment is possible but it takes time. Rapid plane trips which cover several time belts can end in a dislocation of the nychthemeral rhythm. The resetting time needed for readjustment is from 8 to 10 days.

Communication sur le meme theme. (Communication on the same subject.)

Gerritzen, M. F.

Rythme des 24 heures de l'excrétion de l'eau, des chlorures, du sodium et du potassium lors d'un déplacement rapide d'est en ouest et vice-versa. (A 24-hour rhythm of excretions of water, chlorides, sodium and potassium during a rapid translocation from east to west and vice versa.) Presse Medicale (France), 69: 2460, 1961.

The author reports that the periods of the two daily maximal rates of water and electrolyte excretion by the kidneys are upset during a translocation covering five time zones from East to West. Readjustment takes place within at least 4 hours. On returning to the point of departure, readjustment takes place in 2 days.

Bjerner, B., and Å. Swensson.

Schichtarbeit und rhythmus. (Shift work and rhythm.) Acta Medica Scandinavica Supplement (Stockholm), 278:102-107, 1953.

This is a brief paper on a study of the effect of nightwork and shift work on the 24-hour rhythm in man. At a gasworks, certain readings of various measuring instruments were entered hourly in a journal. Every day a periodic check was made on whether the figures were correct and, if not, whether the error was corrected by erasing or crossing out a figure. The readings were done by three men who changed shifts weekly and a substitute who filled in during the others' day (or nights) off. It was possible to study at what times errors occurred from readings processed between 1912-1931, which represented 175,000 work hours. A diagram of the total number of errors (approximately 62,000) at different times indicated that the maximum in errors occurred at night and that there was also a small rise in the afternoon. The change of shift was not of decisive significance in the shape of the curve; the authors feel that this must mean that the peaks of the curve cannot be affected by the increasing fatigue of the individual. The most pronounced 24-hour rhythm in man is to be found in sleep. To see if an adaptation to a new 24-hour period took place, the authors investigated (via questionnaire) sizable groups of industrial workers from different parts of Sweden. There was no tendency to an adaptation in the amount of sleep.

Blushtein, L. E.

МАТЕРИАЛЫ К ВОЗРАСТНОЙ ХАРАКТЕРИСТИКЕ ТАЗА У ЛИЦ ЖЕНСКОГО ПОЛА В СОПОСТАВЛЕНИИ С НЕКОТОРЫМИ ПОКАЗАТЕЛЯМИ ИХ ФИЗИЧЕСКОГО И ПОЛОВОГО РАЗВИТИЯ

(Data on age characteristics of the female pelvis in relation to some indices of physical and sexual development.) Akusherstvo I Ginekologiia (Russian), 46:46-50, 1970.

Complex investigation of age peculiarities of growth of the pelvis in girls, aged 1-20 years, involving the use of anthropometric, anthroposcopic, roentgenological, and biochemical investigations enabled the author to establish a correlation between the growth of the pelvis and the dynamics of physical and sexual development. There were found definite periods of childhood and juvenility which are most marked in respect to growth of the pelvis and development of gonadtotropic and ovarian functions.

Boissin, J. P.

A propos de la tolerance des protheses de contact chez le personnel navigant commercial. (Tolerance of commercial flight personnel for contact lenses.) Revue de Medecine Aeronautique et Spatiale (France), 12(No. 48):568-569, 1973.

This brief study was undertaken by the author to assess the subjective reactions of members of commercial flight crews who wear contact lenses for optical correction of ametropia; the defects corrected were essentially cases of myopia and slight myopia. It is concluded that (i) correction by contact lenses poses no problem when the periods of use do not exceed 3-4 hours of flight between stops; (ii) on the other hand, when the flights are of long duration, problems of poor tolerance become more frequent; and (iii) loss of lenses may occur unexpectedly even on a commercial plane and with no apparent reason. The author thinks that pilots should be more cautious about their systematic use of contact lenses, particularly in those cases in which symptoms of irritation, which often necessitate momentary removal of the lenses, would pose serious safety problems; the change in optical correction from contact lenses to spectacles always involves a certain amount of difficulty.

Bonte, W., and J. Volck.

Untersuchungen zum problem der alkoholnachwirkungen. (Study on the problems of alcohol aftereffects.) Blutalkohol (German), 15:35-46, 1978.

The aim of the investigations was to gather information with regard to the subjective and objective detection of aftereffects (hangover) of excessive alcohol ingestion. For this purpose, tests were performed with 29 subjects. The amount of alcohol ingested was left to their discretion. Within 16 hours after drinking commenced, 12 subjects (Group A) were free of alcohol; 10 (Group B) still showed small residual concentrations ranging between 13 and 45 mg/100 mL (0.13 percent and 0.45 percent); in the remaining 7 (Group C) a blood alcohol concentration of 58 and 123 mg/100 mL (0.58 percent to 1.23 percent) was found. The motor performance test with the bimanual tester showed an unexpected marked decrease in performance in all groups, whereas in the attention test there was a decrease proportional to the blood

alcohol level. The subjective performance efficacy was markedly impaired, especially in the alcohol-free group (Group A). Subjective hangover symptoms were also more commonly experienced in this group than the group with a low-alcohol concentration (Group B) and least common in the group with a higher alcohol concentration (Group C). All subjects considered themselves under the influence, unexpectedly even those who were sober and who estimated their residual alcohol concentration at 50 mg/100 mL (0.5 percent). Their self-assessments differed hardly from that of the subjects obviously under the influence who underestimated their alcohol concentration. The subjects with a low residual alcohol content (Group B) were relatively accurate in the estimation of their blood alcohol concentration.

Bornstein, A., and A. Loewy.

Über den alkoholumsatz beim menschen im höhenklima. (Alcohol metabolism in man at high altitudes.) Biochemische Zeitschrift (German), 230:51-67, 1930.

The result of experiments concerning the behavior of alcohol in the human body at high and low altitudes is discussed. In man, the alcohol content of the blood rises faster and more steeply in the mountains than in the lowlands. After the maximum is reached, the decrease in the alcohol content of the blood is approximately alike in the mountains and in the lowlands. The respiratory mechanics, both with regard to respiratory minute volume and respiratory rate, were found to be as little changed in the mountains as in the plains. In preliminary tests without alcohol, the respiratory quotient (RQ) was regularly lower in the mountains than in the lowlands. The RQ after alcohol intake--as an expression of the alcohol combustion--dropped more sharply in the mountains than in the plains, often to the level of pure alcohol combustion. It returned more rapidly to the original values. In the mountains, just as in the lowlands, after ingestion of alcohol alone, the author found a specific dynamic effect that showed up only when sugar was taken in addition to alcohol. In that case, however, it was stronger than in the corresponding experiments in the lowlands.

Brandt, A.

Über den einfluß der schichtarbeit auf den gesundheitszustand und das krankheitsgeschehen der werktätigen. (The effect of shift work on the physical condition and disease manifestation of workers.) Oslo Proceedings of an International Symposium on Night and Shift Work (German), 1/31-2/1/69, pp. 124-152.

A comparison of standard-, dual-, and triple-shift workers in regard to health risks is presented. Under the three-shift system, the frequency of work-related accidents as well as accidents off the job showed an increase. A comparison concerning the frequency and duration of disease and the disease rate showed that the three-shift system produced the most unfavorable results as compared to the single- and dual-shift systems. Special note was made of the increased incidence of gastrointestinal disorders. An examination by age groups showed that the three-shift system is especially stressful on young workers up to the age of 25; although the workers over 60 are equally taxed, this age group apparently benefits from a certain natural selection process favoring the strongest individuals.

In a further study, the duration of the respective shifts in the three-shift system was examined. In order to avoid an accumulation of the detrimental night-shift effects (insufficient recreational opportunities during the day), the so-called four-shift system (in which each night shift extends, at most, over 2 to 3 days per week) was assessed. A comparison of the disease rate, the total number of cases, and days missed showed that in contrast to the older workers--who in their lifestyle make allowance even for these few days of night shift per week--the younger workers with their daytime-oriented routines make no such allowance. It was shown that for the younger workers, the short night shift extending over 2-3 days represents an additional burden, whereas the situation is more favorable in regard to the older workers, who showed the lowest number of days missed. Since the young workers are heavily taxed already by the conventional three-shift system with its weekly shift changes and unwholesome consequences, this fact in combination with the young workers' attitude produce an even more unfavorable effect in the new system.

Thus, it appears justified to conclude that, if possible, young workers should not at all be assigned to night-shift work. If they are to make proper use of the obvious advantages offered by the 2-3-day night shift rotation, appropriate training and supervision are called for. To the older workers, the 2-3 day rotation appears to offer greater health benefits as compared to the triweekly rotation since it prevents an accumulation of the detrimental effects of nightwork.

Bruno, C., and D. A. Benedetto.

Sui bioritmi della eliminazione urinaria dei 17-KS e degli 11-OS. Nei soggetti il lavoro diurno con turni di lavoro notturno. (On the biorhythms of the urinary elimination of 17-KS and 11-OS. In subjects alternating daywork with night shifts.) University of Ferrara (Italy), General Medical Clinic and Medical Therapy Institute report, pp. 1131-1145.

The authors studied the urinary 17-KS and 11-OS nyctohemeral biorhythmic variability in eight healthy subjects alternating daywork and nightwork. The results obtained and the value of these findings are discussed.

When, because of their work, subjects reverse the normal night/day (sleep/work) rhythm and sleeping-during-the-day working-at-night pattern, there is a reversal of the urinary 17-KS biorhythm. This reversal does not occur simultaneously with the variation in the life pattern, but it begins after 48 hours, is distinct between the 48th and 72d hour, and is always complete by the 6th day. When the subject returns to the more physiological daywork, the new reversal of urinary 17-KS biorhythmic variations to the former pattern takes place more quickly and is quite complete between the 24th and 48th hours. The authors observed a change but not a reversal of the urinary 11-OS nychtohemeral biorhythmic variations for the same subjects and under the very same living patterns cyclically altered.

Chevrolle, J.

Comparaison de la fréquence et de la durée de l'absentéisme chez des ouvriers travaillant en horaire normal et en équipe 2 x 8. (Comparison of the frequency and duration of absenteeism among workers who work normal shifts and on two-by-eight teams. Archives des Maladies Professionnelles (France), 30:348-351, 1969.

This study was conducted on all absenteeism due to illness (excluding on-the-job accidents) which occurred in 1966 among 3,867 workers in a factory in France; 2,424 worked a normal shift and 1,443 worked a 2 x 8 shift. The absenteeism of female workers was not studied. It is concluded that up to the age of 55 years, absenteeism is no higher among the workers employed on 2 x 8 teams with weekly alternations than among those who work normal shifts.

Chevrolle, J.

Horaires de travail et infarctus du myocarde chez les employés de l'Assistance Publique. (Work shifts and myocardial infarctions in National Assistance employees.) Archives des Maladies Professionnelles (France), 24:146-147, 1963.

This is a brief paper on a statistical investigation on work shifts and myocardial infarctions among National Assistance personnel in France. The author determined that the working hours play no role in the appearance of myocardial infarctions or their aftermath. However, he recommends that it would be desirable for convalescents from myocardial infarctions to be beneficiaries of a special fund and be able to resume halftime work for several months.

De Veer, A.

Enkele psychologische aspecten van ploegenarbeid. (Psychological aspects of shift working.) Mens Onderneming (Dutch), 12:357-365, 1958.

The psychological and social-psychological aspects of shift labor are discussed. The influence of shift work on the physical condition of the worker is considered. Two groups of workers were studied: Group I (N = 60) was investigated from a medical-physiological, a medical-psychological, and a social view; Group II (N = 140) was investigated from a psychological (social-psychological) view using the Rorschach test and a nondirective interview assessment. The psychologists focused in particular on the attitude of the participants to the demands of shift work and tried to get an idea of the factors which exerted either a positive or a negative influence on this attitude.

Group I yielded the following results:

1) Objections to shift work increased with increasing intelligence.

2) Married persons found the higher earnings of shift work attractive and therefore were more interested in shift work than were unmarrieds.

3) From the biographical anamnesis as well as from the tests, 50 percent of the group showed a sthenic attitude.

4) Twenty-five percent had vital complaints (strong dislike of shift work, difficulty with weekly changeover, sleeping disturbances, etc.).

5) Seventy percent went to bed directly after night shifts without a full breakfast; 70 percent ate a warm meal during day and night shifts at the same time, usually between 5 and 6 p.m.

6) A comparison between those working first in the day shift and later in the night shift with those for whom the reverse was the case, showed that the latter gave somewhat better results in every respect.

The conclusion of the psychologists was that the entire problem is rather broad because of the many factors which play a role, and that it is also complex because of the different motivations.

Debry, G., and R. Bleyer.

Influence du rythme des trois-huit sur l'alimentation des travailleurs. (The influence of shift working on food intake.) Alimentation et Travail (France), First International Symposium, pp. 153-177, May 1971.

The authors describe the food habits of shift workers. The material of this study is mostly their own and partly those of the bibliography; they considered the part played by numerous factors interfering with the rhythm of shift work in the modification of eating habits. They show that if the average food intake of workers doing a job requiring moderate physical activity is reduced to 3,000 calories, shift work does not change the caloric level, but there are important changes corresponding to the different shifts for the same workers.

Alcohol does not contribute to the total caloric intake to any great degree (8-20 percent) if alcoholic beverages are forbidden during work time and at the place of work, but even this level can increase to 33 percent under difficult social conditions.

Shift work modifies the caloric distribution of the different meals and profoundly disturbs the social surroundings at mealtimes; shift work also entails changes in the kind of food consumed. Shift workers do not exhibit a higher incidence of gastric ulcers but, on the other hand, the incidence of dyspepsia is greater. It is found that those with dyspepsia are the heaviest smokers whether they are shift workers or day workers. The problem of the shift workers' health and nutritional education is not limited exclusively to questions of food intake but concern also social and economic factors, as well as the relation between the workers' food habits and their geographical origin.

Dervillée, P., and H. J. Lazarini.

A propos du travail én equipe avec changement d'horaires. Incidences familiales et répercussion possible sur la santé des travailleurs. (Concerning working in shifts with changes in working hours: Effects on families and possible repercussions on workers' health.) Archives des Maladies Professionnelles (France), 20:306-309, 1959.

Shift work and its effects on health are discussed in this paper. The study was devoted to steady shifts in two types of shift systems: (i) the system (2 x 8) using two successive teams in the course of a day, and (ii) the three-team system (3 x 8). Some possible solutions to reduce the number of unadaptables to shift work are given. Continued investigations into familial factors, health effects of work shifts, and the problem of workers' nutrition (including health education of personnel) are recommended.

Dervillée, P., H. J. Lazarini, and E. Dervillée.

Résultats d'une enquête médicale concernant les horaires de travail. (Results of a medical investigation relating to work shifts.) Archives des Maladies Professionnelles (France), 24:190-192, 1963.

This is a brief, general article of a medical investigation on the health of persons in shift work. The 2 x 8 system, a kind of shift work of a diurnal type is discussed. Although schedules are sometimes fixed (Example: 0600-1400 and 1400-2200), they are more often rotating, the change assuming a weekly rhythm. The authors think the principal inconvenience of this system stems from the rotating characteristic of the shifts; the result is an inability to adapt which brings with it a disturbance of family life. The 3 x 8 system is briefly discussed.

Dirken, J. M.

Een analyse van klachten van ploegenarbeiders en niet-ploegenarbeiders. (An analysis of complaints of shift workers and nonshift workers.) Tijdschrift voor Sociale Geneeskunde (Dutch), 43:794-799, 1965.

In the literature, shift work is often said to have a negative influence on the physical well-being of workers. Complaints concerning sleep disturbances, nervousness, and gastrointestinal disorders should occur more often with shift workers than with nonshift workers. Most research in this area, however, is done by means of interviews which are methodologically not very reliable.

In this investigation, general well-being was measured approximately by a questionnaire developed for this purpose in industry. The questionnaire consisted of many items about more or less vague complaints of neuropsychic and vegetative nature. This general diagnostic procedure has proved to be reliable and to be predictive for environmental stressors in industry.

The hypothesis tested in this investigation concerned a decrease in general well-being of shift workers as compared with nonshift workers. In six different samples, comprising textile, chemical, and metal works, and a municipal service department, a total of 600 shift workers and 1,200 nonshift workers was investigated; they were unaware that shift work was being studied.

The decrease in well-being with shift workers was found to be very significant, but comprised only a mean difference of less than two complaints.

The second aim of this project was searching after complaints more or less specific for shift work. In several ways complaints and patterns of complaints were analyzed. Hardly any complaints were found that were specific or were of importance in the sense that they were expressed frequently by shift workers. It was found that to a certain degree, a stereotype pattern of complaints existed within all groups of industrial workers. The hypothesis is formulated that, by a concealed positive selection, shift workers in general are in some respects less asthenic than nonshift workers which obscures the difference in well-being.

The main conclusion is that, in view of the number of investigated workers and the variety of industries in the sampling, it is probable that, as for the subjective well-being in both its somatic and psychological aspects, shift work, in general, can hardly be called a problem.

Eich, J.

EinfluB der schichtarbeit auf den menschen. (Effect of shift on the human person.) Werkstattstechnic Zeitschrift fur Industrielle → Fertigung (Cologne), 62:34-36, 1972.

The physiological foundations and the medical effects of shift work are described. It appears that work during the second shift is less stressful than work during the night shift. The author believes that disadvantages of shift work can be reduced by type of work, job design, and medical measures.

Essential perspectives for evaluating suitability of workers for night shift are given. The author feels that by carefully taking into account the aspects of the measures he lists, it is possible to reduce the extent of complaints, difficulties, or injuries which people experience under the influence of shift work.

Foret, J., and O. Benoit.

Étude du sommeil de travailleurs à horaires alternants: Adaptation et récupération dans le cas de rotation rapide de poste (3-4 jours). (Study of sleep on workers on alternating schedules: Adaptation and recovery in rapid shift rotation (three-four days.) (French) European Journal of Applied Physiology, 38:71-82, 1978.

An electroencephalographic study was performed on shift workers at an oil refinery. The recording of diurnal sleep showed profound disorganization of the first diurnal sleep (very short duration, drop in the absolute value of paradoxical sleep (PS) and slow-wave sleep (SWS)); and a tendency to improved sleep characteristics (duration, amount of PS and SWS) during diurnal sleep.

Periods of nocturnal recovery sleep differed depending on whether they followed restricted nocturnal sleep or diurnal sleep. Nocturnal sleep which immediately followed diurnal sleep displayed only partially the characteristics of a true recovery. Thus, it seems that the beginning of an adaptation to the inverted schedules had taken place. This result supports the notion that a rapid rotation of shifts (3-4 days) limits both the accumulated sleep deficit and adaptation to the inversion of the schedules.

Fröberg, J. E., and T. Åkerstedt.

Auswirkungen der nacht- und schichtarbeit auf die gesundheit. (Effects of night work and shift work on health.) Arbeitsmedizin-Sozialmedizin-Praeventivmedizin (German), 9(10):223-226, 1974.

This paper presents an overview of research results concerning the general relationships between distribution of working time, well-being, and performance. The authors feel that the most significant aspect of shift work is somnipathy

(sleep loss or lessor quality of sleep). This topic is covered under a general rubric of "shift work and health." Social effects and performance effects of shift work are also considered followed by a general discussion of the overall findings of the several studies noted.

Furon, D., P. Frimat, J. -F. Caillard, H. Labriffe, A. Thilliez, and F. Broussier.

Aspects médicaux, sociaux et professionnels du travail en équipe chez les femmes. (Medical, social and professional aspects of shift work among women.) Archives des Maladies Professionnelles (France), 39(3):121-139, 1978.

To study the true working conditions of women, an investigation was carried out in the textile industry at Wervicq among 254 women workers. The analysis of the results considered professional life (working schedules, nuisances), extraprofessional life (family burden, housework, spare-time activities, sleep), repercussions of actual work experience, and absenteeism. With regard to the various difficulties of working women, it was necessary to consider recommendations and decisions concerning industrial as well as state authorities.

Gabersek, F., F. Lille, and J. Scherrer.

Sommeil de jour d'un groupe de travailleurs de nuit. (Daytime sleep of a group of night workers.) Transactions of the Third Congress, Ergonomics Society, Paris, France, 1965, pp. 315-318.

A group of night workers (N = 15) in a Parisian highway construction firm volunteered for this investigation of daytime sleep. These volunteers were all male and ranged in age from 24 to 43. They had regularly worked from 2230-0630 and had been doing so for at least 2 years. Their sleep was recorded in the laboratory for 3 consecutive days and 10 of the volunteers supplied the investigators with their sleeping schedules at home during the month following the laboratory recording.

The recording consisted of three electroencephalogram leads (frontal, vertex, and occipital), an electro-oculogram and an electrocardiogram, an actogram from an electric-piezo quartz and a recording of respiratory frequency. The results of average duration of sleep, evolution of cardiac frequency, depth of sleep, and motility are given. Sleep-at-home records are also discussed.

Gillon, Dr.

Les rythmes du travail. (The cadences of work.) L'Hygiene Mentale (France), 46:36-67, 1957.

This is a committee report on the proceedings of a meeting on "The Cadences of Work." The discussion included whether there was evidence to prove that certain specific types of work schedules and cadences produce mental problems (maladjustment syndromes such as overwork, production problems, and safety risks as well as the classical syndromes of psychoses and marked neuroses).

Some preventive measures recommended were: (i) it is advantageous to prolong work cycles; night workers should be medically monitored and attending doctors

should be informed of effective treatments at the beginning of problems; (ii) when a wife's salary is a supplement to the husband's salary, it is desirable to allow her to work halftime; (iii) sociological studies should be made to specify how schedules should be coordinated; (iv) whenever possible, it is better to let the workers spontaneously adopt their own distribution of rest periods; (v) details of each job and each man-and-job unit must be studied; (vi) attention should be paid to eliminating (for example, soundproofing) harmful environmental factors; (vii) physiological studies should determine series of work actions that promote a saving of nervous energy; and (viii) observation of large variations in the speed of work should systematically instigate the beginning of an etiological study involving its possible physical and human causes.

Godard, J., A. Delabroise, J. C. Monnier, G. Durrmeyer, C. L. Moillie, and C. Colmiche.

A propos du travail sur trois tournées dans la sidérurgie Lorraine. (In regard to work on three shifts in Lorraine iron and steel metallurgy.) Archives des Maladies Professionnelles (France), 24:135-139, 1963.

This article discusses findings on medical, family, and social problems among metallurgists on three shifts (0600-1400, 1400-2200, and 2200-0600) succeeding each other at 3-week intervals. Subjects, 300 men who had at least 2 years of 3-shift work, were interviewed, given a clinical exam, and a study was made of their medicosocial records.

Four findings were listed: (i) sound sleep is not only a constitutional aptitude varying in people, it is also more generally the prerogative of youth, (ii) while young men can generally adapt fairly easily to working in three shifts, this is not so for anybody who is over 40, and even less so for a man of mature age going back to this type of work after a break of several months or years, (iii) fatigue, caused by light, restless sleep was more often the characteristic of the subjects assigned to supervisory (or more responsible) work, which requires superior mental functioning, than it was among manual workers, and (iv) favorable conditions make for better sleep.

Grandjean, E.

Heures de travail et pauses. (Working hours and rest periods.) Zeitschrift fuer Praeventivmedizin (Switzerland), 3:237-243, 1958.

The present work reviews scientific management's present knowledge of the physiology of work as concerns working time and rest periods. In principle, prolonging working time results in a decreased hourly production rate and an increase in illness and accident rates. On the other hand, shortening working time increases hourly production rates and decreases absence due to illness and accidents. From the physiological point of view, daily working hours should not exceed 8 hours or 8½ hours at most. Reducing the lunch to 60 minutes and eating at a canteen become necessary when the worker loses 30 minutes or more in travel time between the factory and his home.

Rest periods during working time are a physiological necessity. The most frequent rests are disguised rests, involuntary pauses, and official rest periods. Their duration depends on the type and organization of the work. To conclude, the author gives some recommendations concerning the application of official rest time.

Grandjean, E.

La prévention de la fatigue par l'adaptation des horaires de travail et du régime alimentaire. (The prevention of fatigue through the alteration of work and meal schedules.) Zeitschrift fuer Praeventivmedizin (Switzerland), 10:24-34, 1965.

Fatigue determines the relationship linking the duration, intensity, and output of labor. An increase in the duration of labor decreases intensity and total output per day. According to ergonomics, a workday of 8 hours is recommended. It would be preferable to have a 5-day workweek only every 15 days, in order to limit the daily duration of labor to 8½ hours.

A continuation of labor is imposed when workers lose a half-hour or more in going home from the plant. Under such conditions, ergonomics recommends dividing the labor day into four periods of about 2 hours each, with two recesses of 10 to 15 minutes and one longer recess of 45 to 60 minutes in the middle of the day. Experiments show that it is desirable to distribute nourishment among five daily meals, including snacks in the middle of the morning and afternoon during breaks. The number of calories should be adapted to the intensity of physical labor. In a large enterprise, scattered snack bars and dispensing machines are efficient measures.

Grandjean, E., and H. W. Jaun.

Ermüdungsmessungen bei telephonistinnen während der nachtarbeit. (Fatigue measurements with telephone operators during night work.) Zeitschrift fuer Praventivemedizin (Switzerland), 5-6:143-152, 1960.

The methods and results of fatigue measurements on telephone operators during the late shift and night shift are reported. At midnight, after the late shift, and at 0630, after the night shift, these measurements from 25 and 14 operators, respectively, yielded the following results: (i) an average reduction of performance capability in a manual dexterity test. However, this was statistically significant only after the late shift; (ii) an average reduction of the subjective flicker fusion frequency by 2.1 Hz and 1.3 Hz, both of which were statistically highly reliable; and (iii) an average extension of the simple visual reaction times by .012 seconds and .013 seconds, both statistically very reliable. The impairments of performance are interpreted as fatigue phenomena and are compared with earlier, already published results of fatigue measurements during the telephone operator day shift.

Guenther, B., and V. Hobi.

Determinationsleistung und drehsinnschwelle bei geringer alkoholdosierung (um 0, 5 o/oo) unter berücksichtigung habitueller und situativer persönlichkeitsaspekte. (Determination performance and angular acceleration

threshold under the effect of small doses of alcohol (approximately 0.5 o/oo) in relation to habitual and situative personality aspects.) Pharmakopsychiat. (German), 9:323-331, 1976.

In a parallel crossover design, 22 male students were examined with 0.6 g/kg alcohol (0.5 o/oo). The dependent variables were attentiveness, sensorimotor coordination, angular acceleration threshold, and mood. A number of personality trait factors (Freiburg Personality Inventory, Maudsley Personality Inventory, alcohol and tobacco consumption habits, body measurements) and state factors (subjective and psychophysiological states) were also measured. Other factors were kept constant (age, sex, intelligence, standardized breakfast, duration of drinking time, daily and weekly fluctuations).

Accelerated elevation of the blood alcohol concentration (BAC) was connected with mental instability and poor condition on the day of the experiment. Accelerated elimination of alcohol generally varied with alcohol habits and poor condition. Determination performance measures (attentiveness and sensorimotor coordination) were significantly reduced under alcohol (at a BAC of 0.42 o/oo) and sensitivity of angular acceleration perception was greatly reduced (at BAC's of 0.30, 0.44, 0.38, and 0.21 o/oo). The reductions in performance were associated with brightening of the overall mood. It is concluded that both habitual and situative personality characteristics can exert a detrimental effect on performance under small doses of alcohol.

Hadengue, A., J. D. Reynaud, and A, Reinberg.

Les incidences psycho-physiologiques et les aspects pathologiques de la répartition des horaires de travail. (Psychophysiological influences and pathological aspects of the distribution of work schedules.) Archives des Maladies Professionnelles (France), 24:1-45, 1963.

Legal provisions relative to working hours and the principal work schedules used in France are reviewed. Their biological and work rhythms are reviewed, psychosociological repercussions as they affect the individual are examined, and medical aspects are considered.

In conclusion, the authors state that a normal subject in good health and having a satisfactory physiological and psychological equilibrium is capable of adapting without harm to a distribution of different work schedules and in particular to night work. As a general rule, night work does not have pathological influences on normal subjects when there is sufficient time for rest and sleep. The authors caution against underestimating the fundamental importance of the individual adaptation factor, which is extremely variable depending on the subject. Recommendation is made that an industrial physician be consulted when a new distribution of work schedules is being planned, especially when introducing nocturnal activity, whether it is permanent or in shifts.

Hobi, V., P. -Chr. Miest, R. Richter, E. Schwarz, L. Goldberg, D. Ladewig, and G. Reggiani.

Der zeitliche verlauf der alkoholwirkung in skalen der selbstbefindlichkeit. (The time-course of alcohol-induced changes in self-rating-scales of mood.) Pharmakopsychiat. (German), 9:313-322, 1976.

Alcohol was administered in a dose of 0.77 per kg bodyweight to 16 healthy male subjects in a crossover design. A study was made of a number of psychological and physiological variables to determine the modifications that accompany the alcohol-induced changes in the orienting response to an auditory stimulus. Five determinations were made at intervals following a dose of alcohol and five in a control session when no alcohol was given. The results obtained for the psychological variables (self-ratings of the intensity of intoxication and the degree of being startled by the first stimulus and self-assessment of mood) showed alcohol to have stimulant as well as depressant effects. Some of the variables showed stimulant effects, mainly at the beginning of the absorption phase, whereas other variables showed depressant effects, both in the absorption phase and the post-absorption phase. Changes in physiological variables (such as parameters of electrodermal activity and of the heart rate response) supported these findings. The simultaneous presence of both stimulant and depressant effects is pointed out as well as the difficulties in describing these findings in terms of a unidimensional model of activation.

Jindrichova, J.

Možnosti střídáni směn v třisměnném provozu při zkrácené pracovní době. (The possibility of rotating shifts in a 3-shift system with reduced working hours.) Pracovni Lekarstvi (Czechoslovakia), 12:500-504, 1960.

The author investigated work inability due to sickness in 38 employees of a chemical plant in a workshop operating continuously; a hazard of carbon disulphide intoxication was involved. In the workshop, alternating shifts were introduced: two morning, two afternoon, two nights, and two days off. Temporarily, on 1 day off twice a month, an extra morning shift was included to comply with the legal working hours of 46 hours a week. The group was investigated for 3 years before and 4 years after the introduction of this working rhythm. Except for a higher incidence of conjunctivitis (caused by carbon disulphide and hydrogen disulphide), no deviations were recorded in the length and causes of work inability of the group under investigation; the group's average was lower than in other workers of the workshop exposed to the same hazard; for a period of 3 years it was even lower than the average for the whole plant. As to subjective findings, the workers reported less fatigue, as two consecutive night shifts were less strenuous than night shifts for a whole week. The length of sleep with this sytem was on an average 6 hours after a night shift, 8 hours after the morning shift, and 9 hours after the afternoon shift. The working efficiency of the whole workshop involved, where simultaneously the sanitary conditions at the place of work were improved, rose substantially. This working rhythm will be suitable for three-shift plants and in particular for workshops where, according to valid regulations, women work night shifts. It will be possible to use it when introducing 7-hour working days at these places of work.

Kennholt, I., and M. Bergstedt.

Attitudes toward the work and working conditions among traffic control personnel in the aviation administration. Personaladministrativa Radet, Personnel Administrative Council (Stockholm), pp. 1-85, January 1971.

This report examines attitudes of air traffic control (ATC) personnel (N = 265) toward their employment situation and their working conditions. Both interviews and questionnaires were undertaken. Interviews showed that ATC personnel are critical of administrative activities and of the way safety problems are handled. The risk of prosecution in the event of accidents is thought by many to be a heavy strain; criticism was directed against lack of support from management in such situations. Dissatisfaction was concentrated in two areas--personnel policy and relations with administrative personnel. A copy of the questionnaire used in the study is included.

Knauth, P.

Kriterien für die beurteilung verschiedener schichtwechselformen. (Criteria for classification of different forms of shift change.) Zeitschrift fuer Arbeitswissenschaft (German), 29(1NF):233, 1975.

The aim of the investigation was to determine objective criteria for classification of different forms of shift change. Indications were obtained for optimization of shift patterns with the aid of the following criteria: the circadian rhythms of different physical and psychic functions, sleep, and real leisure time. The author concludes that because of the heterogeneous nature of workload and the social circumstances of different work places, it is not possible to design a single optimal shift plan. Nevertheless, he feels that general recommendations which facilitate optimization of shift plans can be made based on the criteria noted above.

Knauth, P., and J. Rutenfranz.

Untersuchungen über die beziehungen zwischen schichtform und tagesaufteilung. (Examinations of the relationship between types of shifts and the use of the day.) Internationales Archiv für Arbeitsmedizin (German), 30:173-191, 1972.

The effects of all kinds of shifts and of socio-demographic conditions on leisure time and sleep are discussed in detail. Time-budget studies were performed over a period of 8 days for 466 air traffic controllers on shift work. These studies were based on the analysis of 3,544 days and included some socio-demographic variables. It became apparent that the way the day was divided between work and leisure was dependent on the type of shift. Leisure time and sleep were reduced especially in connection with the combined morning and night shift, with combined night shifts and with all shifts longer than 8 hours. Leisure time was shorter in people under 45, married people, self-supporting people, parents of children younger than 6 years, and persons with bad sleeping conditions. The night sleep of most of the air traffic controllers was disturbed by road and air traffic and the day sleep by the noise of children and road traffic. The combined study of specific socio-demographic data and time-budgets turned out to be a suitable method of obtaining objective criteria for the assessment of shift-change systems.

Knauth, P., and J. Rutenfranz.

Arbeitsphysiologische und arbeitspsychologische hinweise zur gestaltung von schichtplänen. (Industrial physiological and psychological guidelines for planning shift work.) Arbeitsmedizin-Sozialmedizin-Praeventivmedizin (German), 10(10): 197-200, 1975.

From the work-physiological and work-psychological point of view some recommendations for the improvement of shift rotations are made. Taking into account certain restrictions brought about by the stress of the work, the influence of noxious substances, and the sleep of the shift workers, regular 12-hour-shift systems are considered as one good possibility for the arrangement of continuous work systems. If possible, the duration of the shift cycle should in general not exceed 4 weeks so that the transparency of the shift is guaranteed. Rotating shift systems with--if possible--single interspersed night shifts and a free period of 24 hours after every night shift are recommended. Free time at weekends should be stressed with continuous work systems also. If a change from a 42-hour to a 40-hour week is intended in a continuous work system, it seems to be a sensible solution to maintain the 42-hour shift rotations. The officially shorter working hours should then be made up for by free shifts, granted firstly in connection with bank holidays and secondly, in the course of the year.

Kristoffersen, M. B.

Psykologiske undersokelser av rundskiftarbeidere. (Psychological research on shift workers.) Nordisk Psykologi (Swedish), 5:187, 1953.

This is a brief, general article on psychological research on shift workers in three Norway firms in the metal industry. Interviews and two questionnaires provided the basis for studying the work force as well as providing information on living and family conditions, age, length of employment, and certain work conditions as they became apparent in different plants and in different jobs.

Kürz, E., and E. Kraepelin.

Ueber die beeinflussung psychischer vorgänge durch regelmäfsigen alkoholgenuss, (About the influence of regular alcohol consumption on psychic events.) Psychologische Arbeiten (German), 3:417-457, 1901.

This study involved participation by the two authors to determine the effect which an amount of alcohol may have on the mental performance of individuals when it is taken regularly day by day. The purpose of the study was to determine behavior of the individuals in regard to (i) conceptual capacity (memory drum experiments), (ii) learned associations (addition of numbers), (iii) free associations, and (iv) retention capacity (learning of numbers).

Results showed the following deleterious effects of alcohol (i) a slowing down in adding numbers, (ii) a reduction in the learning of numbers, (iii) handicapped associations, and (iv) greater difficulty in comprehension. Based on these results and those of other researchers, the authors conclude that a single alcohol dose of about 80 g of alcohol does not vanish rapidly and completely but leaves behind a

certain aftereffect which has not fully disappeared after 24 hours. When this dosage is repeated after consecutive 24-hour intervals, gradually an accumulation effect takes place which must be designated as the first suggestion of chronic alcoholism; specifically, it can be identified very definitely after only 12 days of alcoholization, since it consists in a loss of 25-40 percent of work performance. The learning of numbers is more strongly influenced than the process of addition. This agrees with the observations of daily life. Ordinary physical or mental work is still performed by the drinker without conspicuous trouble, but the capacity for more difficult and high level work gets lost. Once the damage has been produced it will cure itself only very slowly, apparently more slowly with the longer the use of alcohol. After an extended time on alcohol, there remains for a considerable period of time a great sensitivity against alcohol in spite of severe and complete abstention. Actually, the toxic effects after a period of abstention appear more rapidly and stronger than initially.

Lersch, P., and E. Ulich.

Schicht- und nachtarbeit in psychologischer sicht. (Shift work and night work from a psychological perspective.) (German) American Journal of Psychology, 71:123-135; 1958.

The psychological-sociological aspects of shift work and night work are discussed. The studies were performed by interview method. A total of 457 male workers were interviewed. According to the authors, sleep is to be regarded as a central problem in evaluating effects of night work and shift work on the working person. Impairments in other life areas are also often determined by sleep disturbances.

Leuliet, S.

Douze années de travail poste 3 x 8. (Twelve years on the 3 x 8 shift system.) Archives des Maladies Professionnelles (France), 24:164-171, 1963.

This paper gives background information on the 3 x 8 shift system. Several studies of different approaches concerning shift work are summarized. The author states that certain notions remain common to all: the effect of shift work on sleep, the degree of tolerance inversely proportional to the degree of psychological advancement, the primary importance of both family and job environment, and the overriding primacy of financial imperatives. The author's sample consisted of 334 synthetic textile plant workers who had been employed for 12 or more years on the 3 x 8 shift. The shifts ran from 0600-1400, 1400-2200, and 2200-0600, for 7 consecutive days. The rotation of job tours involved 7 days on the 0600-1400 shift, followed by 2 days off; a second 7 days on the 2200-0600 shift, followed by 3 days off; and a third 7-day tour on the 1400-2200 shift, followed by 2 days off. This sample was compared with other workers (N = 230) who worked only in the daytime (0800-1700) in the same plant over the same period of time; factors compared were age, length of time on the job, family situation, and distance from home to place of work. Also, illnesses, on-the-job accidents, accidents to and from work, weight variations, digestive disturbances, and difficulties in sleeping were explored.

In summarizing his results the author considers that shift work is, in the long run, fairly well "undergone" by a great majority of workers, most often for reasons

of financial imperatives. What remains is (i) that a number of subjects complain of more or less minor disturbances but only when asked directly, (ii) that a number of subjects lose more weight than on daytime work, and (iii) that the true pathology of shift work is to be found in good or bad tolerance for daytime sleeping.

Liden, L., and J. Wallander.

Skiftarbete i verkstadsindustrin. (Shift work in the mechanical industries.) Industrial Research Institute, Pamphlet No. 16, pp. 1-131, 1959.

This book discusses the economic consequences of introducing shift work on a large scale into mechanical industries in Sweden. Introductory material deals with the occurrence of shift work in Sweden and other countries, the Mechanical Industries Association study, conditions in the shipbuilding industry, and shift work in mechanical industries abroad. A theoretical model on the economy of double shifts is presented followed by the results of the authors' study. The basic plan of the study is detailed and the effects of two shifts on various cost items (capital equipment, labor, material, various manufacturing costs, and total manufacturing cost in a transition to double shifts) are presented. Finally, developments such as receipts, production factor costs, and technical changes brought about by shift work are discussed.

Lille, F.

Le sommeil de jour d'un groupe de travailleurs de nuit. (Studies on day-sleep among night-shift workers.) Le Travail Humain (France), 30:85-97, 1967.

Tests were conducted in a laboratory on night workers comparing day-sleep with classical data on night-sleep and the statistical sample thus obtained was analyzed on the basis of questionnaires and individual sleep cards. The following results were noted: (i) day-sleep lasted approximately 6 hours, (ii) on the basis of EEG states and motility, day-sleep is lighter than night-sleep, and (iii) the decrease in heart rate for day-sleep is lower than the decrease observed for night-sleep. These facts do not seem to indicate an inversion of biological rhythms. Finally, a sleep debt is always noted and it is paid during nights off from work through the week.

Longo, L.

Psicopatologia dei controllori del traffico aereo e degli operatori-radar. (Psychopathology of air traffic controllers and radar operators.) Rivista di Medicina Aeronautica e Spaziale (Italian), 39:329-341, 1977.

The author discusses, on the basis of personal observations and experiences, a nosographic classification of the most frequently encountered syndromes and psychopathological states. The work activity of air traffic controllers and radar operators has quite specific environmental, technical, and operational aspects that may possibly give rise to a stress effect together with a resultant psychopathology of variable intensity. A number of considerations and proposals suitable for their prevention and control are also formulated.

Lorenzoni, E., H. Lechner, N. Geyer, K. Manowarda, and H. Maurer.

Rheoencephalographische und EEG-untersuchungen unter hypoxie und alkohol. (Rheoencephalographic and EEG examinations under hypoxia and alcohol.) Nervenarzt (German), 39:25-31, 1968

Cerebral regulatory mechanisms in the acute hypoxia test were tested in 21 healthy subjects. Cerebral circulation and cerebral function were registered simultaneously by rheoencephalography and electroencephalography (EEG), respectively. Tests were performed first under normal conditions and then under the effect of alcohol. Results were recorded in detail and correlated. Essentially, there was a greater increment in cerebral circulation in the hypoxia test when it was performed under the effect of alcohol; but fluctuations were then also greater. In this connection, the considerable increase in circulation immediately after termination of the oxygen deficiency state was the most striking finding. EEG modifications were more pronounced under the effect of alcohol than during normal conditions. These occurred earlier in the hypoxia test and persisted longer after its completion than under normal conditions. It could be demonstrated that not only the level of the blood alcohol content but also the autonomic system (which is disturbed by alcohol) exert a direct effect on the cerebral regulatory mechanisms.

Loskant, H., and F. Hoechst.

Der einfluB verschiedener schichtformen auf die gesundheit und das wohlbefinden des wechselschichtarbeiters. (The effect of various shift systems on the health and well-being of shift workers.) Zentralblatt für Arbeistmedizin und Arbeitsschutz (German), 20(5):133-144, 1970.

This paper gives an overview on the results of various studies which have been carried out on shift work and its effect on the health of workers. The authors recommend that an 8-hour work period should never be exceeded even with alternating shifts and that a study should be done from the point of view of occupational medicine with examinations on appointment and checkups at intervals of 2 to 3 years.

Martin, R.

Methodik. Osteometrische technik. (Methodology. Osteometric technique.) Lehrbuch der Anthropologie (German), 1:519-525, 1957.

This paper deals with techniques of osteometric measurements. Values are given as differences in length between the bones of the living being and those of the cadaver for the four largest bones of the extremities.

A description of the measurements of the spinal column (without the sacrum) with an index of the anterio-posterior vertebrae is given. Twenty-three primary measurements of the sacrum and coccyx are presented (cornua coccygea are not included in the measurement). A figure of the anterior median sagittal curve of the sacrum is included.

Martinet, P.

Le travail avec décalage d'horaire n'entraîne pas forcément des troubles psychophysiologiques. (Working under staggered time-tables does not necessarily lead to psychophysiological troubles.) Archives des Maladies Professionnelles (France), 24:196-201, 1963.

Weight changes, digestive troubles, absenteeism due to sickness, anorexia, feelings of fatigue, and irritability in workers in a spinning mill on a 4 x 8 shift (N = approximately 1,000) were analyzed. The obtained data did not support a less favorable physiological condition for workers on this particular shift as against day workers.

Causes for general satisfaction with the 4 x 8 shift seemed to be the following: (i) salaries were relatively higher, (ii) the number of working hours was reduced for many employees in this particular company, (iii) usable free time was increased, (iv) family life, in the aggregate, was still "normal," and perhaps improved, and (v) a more humane environment was preserved, which in general can be considered good in most of the workshops. The conclusion is made that good psycho-physiological equilibrium of the workers is compatible with the way of living dictated by the 4 x 8 type of shift.

Martinet, P.

Incidence des conditions de travail sur la fréquence des troubles digestifs des ouvriers en feu continu. (Effect of working conditions on frequency of digestive disorders in workers on uninterrupted shifts.) Archives des Maladies Professionnelles (France), 25:56-59, 1964.

Digestive disorders among workers on uninterrupted shifts with changing hours and among workers on a normal "day" schedule are discussed. The following hypothesis is given to explain the apparent contradiction of frequency of digestive disorders among the two groups of workers. Digestive disorders confirmed in rotating shift workers are manifestations of a neurovegetative imbalance and the factors of a good neurovegetative equilibrium may compensate (if they are sufficiently significant) for the factors of a poor equilibrium.

The author concludes that (i) the causes customarily advanced to explain an abnormal frequency in digestive disorders among workers certainly exist but are not enough to explain all the differences found from one plant to another or, in the same plant, from one group of workers to another; (ii) good digestion alone does not appear necessary for an individual to be considered suited for work with schedule changes; (iii) an abnormal frequency of digestive disorders in a workshop constitutes a test situation that allows evaluation of the degree of adaptation of workers functioning in that workshop; (iv) to prevent an abnormal frequency of digestive disorders in a workshop on an uninterrupted shift, better results will probably be obtained by improving working conditions than by giving advice on contents of snacks; and (v) the appearance of digestive symptoms in one shift worker makes changing his/her hours justifiable. The author feels that an occupational physician in a factory on an uninterrupted shift with changing schedules cannot

base his conclusions as to the assignment of personnel to a day position or to one or another shift position solely on physiopathologic considerations and that social and psychological conditions often have a greater influence.

Milosevic, S., Z. Milosavljevic, and S. Savic.

Psihofiziološke sposobnosti operatora u toku rada. (Operators' psychophysiological abilities during work.) Arhiv za Higijenu Rada, (Yugoslavia), 27:191-201, 1976.

A group of operators working at the control panel of the Djerdap Hydroelectric Power Plant was given a battery of tests consisting of biochemical tests (adrenalin, noradrenalin, and 17-OHCS), a physiological test (arterial blood pressure), tests of vision (accommodation, convergence, phoria, and adaptation in the dark), psychological tests (visual and acoustic reaction time), and subjective estimation of fatigue. The battery of tests was administered before and after work (0600, 1400, and 2200 hours) on the three different shifts in accordance with the 2-day constant system of shift rotation. Characteristic changes were noted after work on all shifts but only changes following work on the night shift and changes in adaptation to the dark after the afternoon shift were statistically significant. The nighttime workload and sleep deprivation act significantly to increase arterial pressure, to decrease accommodation, to bring about changes in lateral phorias, to lengthen the time of adaptation to the dark, to increase the standard deviation of auditory reaction time, and to increase the degree of subjective fatigue.

Mizumoto, K., O. Fujiwara, and N. Utsuki.

航空機の着陸と着陸時の高度及び距離判断に関する視覚的情報

(Quality of pilot landing performance and visual information about altitude and distance.) The Reports of the Aeromedical Laboratory, JASDF, (Japan), 18(2):71-82, 1977.

A study was conducted based on a working hypothesis that the glide path of landing by visual flight rule (VFR) is likely to be higher due to the fact that "aircraft pilots have a tendency to underestimate altitude and distance during final approach by about 10-20%." Glide paths of various aircraft landing by VFR were monitored with a ground-controlled approach (GCA) precision radar and photographed. A survey was conducted by questionnaire concerning the judgment of roundout time among the pilots. The following points were elucidated:

1. Although the glide paths during final approach varied slightly by different types of aircraft, they generally approximated a gigantic arc of a circle on a vertical plane connecting the three points: the position of initial aligning of the aircraft to the runway, and the two ends (midpoints) of the runway;

2. The glide paths were generally higher than the glide path by GCA. However, this is the combined result of various factors and cannot be explained by the sensations or perceptions of the pilots alone, namely, that they "underestimate the altitude and distance during final approach by about 10-20%";

3. Of the forward perspective components of the runway, those of the two ends (especially the near end) and the base angle of the trapezoid as a projected form

are believed to be helpful in judging the distance to the touchdown point. The perspective with respect to depth is believed to be helpful in judging the deviation in altitude from the glide path of the gigantic arc of a circle during final approach; and

4. The judgment for the roundout time immediately prior to touchdown was mainly based on information such as the perspective of the runway, relative positions of the nose of the aircraft and runway, sensation of sink rate, etc. However, pilots of C-1's and T-34's obtained some information from instruments as well.

Nainys, I. V.

Идентификация личности по проксимальным костям конечностей

(Identification of persons according to the proximal bones of the extremities.) Identifikatsiya Lichnosti Po Proksimal 'Nya Kostyam Konechnostoy (Russian), 1972

Proximal bones of extremities, i.e., humeral and femoral bones, are often the object of the forensic osteologic and paleoanthropologic examinations because they remain in a rather good state for a long time after death. However, the significance of the investigation of the above mentioned bones for a person's identification is not yet well established.

Somatometrically, 253 corpses of inhabitants of Kaunas (133 men and 120 women) were examined. Their morphological data did not differ much from analogical data established by other authors in living Lithuanians. Only the width of shoulders (to 9 percent) and the length of feet (to 6 percent) were smaller because of the postmortem alterations. Both humeral and both femoral bones were taken from the corpses. After the mechanical cleaning away of soft tissues, the bones were measured and their radiograms or xeroradiograms made. Afterwards, parallel cross-section plates, 0.25 mm thick, were cut from the middle of diaphysis by means of an original apparatus and examined planimetrically, microradiographically, and after decalcification, also histologically. Additionally, osteoscopic and osteometric examinations of bones were made after their maceration in weak alkaline water. The bones with divisible epiphysis after maceration were considered to belong to children and those with nondivisible epiphysis were considered to be of adults. Among investigated corpses of adult persons, 117 were of males aged from 18 to 90 years old and 107 of females aged from 16 to 91 years. The children's group was just described. The data of the adult group were treated by means of mathematical statistics with the help of computers.

Statistic parameters of humeral and femoral bones did not differ much from the parameters described by other European and North American authors. The maximum length of humeral bones did not differ statistically from the length of brachium,

and the length of femoral bones in the physiological position did not differ from the length of the thigh, though in certain other reports they differed. Correlation analysis of received data was made using Vyhandu's (1964) method.

In order to determine the sex of the persons from the data obtained during the examination of humeral and femoral bones of the corpses, the diagnostic coefficients were calculated by means of a sequential analysis method. These diagnostic coefficients allow determination of sex in the level ± 128 ($p < 0.05$) in about 90 percent of the cases, and in the level ± 300 ($p < 0.001$) in about 67 percent of the cases.

Age changes of humeral and femoral bones in children and adults are presented. It was established that the angle of the femoral neck depends more on the platymeric index than on the age of the person. The wall of diaphysis becomes thinner with age than is indicated by the index of massivity.

Calculation of regression equations and tables for determination of stature, lengths of arms and legs from data of examination of humeral and femoral bones, and some other data concerning identification are presented. The lateral asymmetry of bones and individual features, e.g., lesions and diseases, hypertrophy of physical activity after the amputation of one limb, changes resulting from paralysis of some muscle groups, and total inactivity are described.

The author suggests a forensic osteological examination method which must be carried out only in well-equipped osteological laboratories and in a certain order: sex, age, stature, and individual properties of the investigated person. The author's experiences in the field of osteological identification of corpses exhumed from multiple graves, of victims of aircraft crashes, of paleoanthropological objects from the 15th-16th century cemetery in Silelis (district of Kaunas, Lithuanian SSR), and also the identification of the remains of the Lithuanian writer Kristijonas Donelaitis (1714-1780), are presented.

Narozny, K., B. Niedbala, A. Pilawski, A. Pruszewicz, and A. Obrebowski.

Miernik czasu reakcji motorycznej prostej na bodziec akustyczny maskowany bialym szumem. (Simple motor reaction time measurement following acoustic stimulus masked with white noise.) Otolaryngologia Polska (Polish), 30(6):591-596, 1976.

Measurements of the time of simple motor reaction to acoustic stimuli and light stimuli in connection with other tests may be useful in audiological diagnosis, particularly in cases of central hearing disturbances. The main element of the equipment used to measure this time was a meter measuring the time of reaction. The meter was author-designed and time intervals between successive acoustic stimuli were programed in it. The measurement error was reduced considerably owing to introduction of digital integrated systems and contactron switches. The measurement permits the time of simple motor reaction to acoustic stimuli fed into one ear to be determined. The intensity and frequency of the stimuli are regulated and it is possible to mask them with white noise.

Otto, V. L.

Die belastungssituation der schwester im dreischichtdienst. (Pressure on nurses in the three-shift service.) Zeitschrift fuer Aerztliche Fortbildung (German), 75(5):245-249, 1978.

This paper discusses the implementation of a guideline for improving medical care of employees in health and social institutions, as well as an accident prevention order. These provided an occasion to check the results of a community project on the health status of nurses in the inpatient section of an industrial health area under the aspect of three-shift work. Data were evaluated from 722 nurses, and the results from 381 three-shift nurses were compared with those of nurses without shift work. Selected influential factors were tested by studying the effect of qualitative influential quantities on a qualitative action quantity by means of the 2I Information measure of Kullback. This measure uncovers differentiated pressures and health impairments. They are the basis for conclusions concerning the further form of medical and operational care of nurses.

Paul, H.

Unfall und krankheit in ihrer bedeutung für den kohlenbergbau. (The significance of accidents and illnesses for coal mining.) Zentralblatt fur Arbeitsmedizin und Arbeitsschultz, (Germany), 8:148-156, 1954.

This study is based on an analysis of accident and sickness statistics of a mine in the Ruhr area. Using an arbitrarily selected working unit as an example, it presents loss of working time consequent on accidents and sicknesses on the part of the miners. The annual periodicity of lost time is also analyzed. The results form the basis for suggestions for preventing and combating the causes of these losses.

Petrosyan, N. G.

УСТАНОВЛЕНИЕ ПОЛОВОЙ ПРИНАДЛЕЖНОСТИ ВОЛОС ПО СОДЕРЖАНИЮ В НИХ НЕОРГАНИЧЕСКОЙ СЕРЫ

(Organic sulfur content used to identify male or female hair.) Gor'kiy Nekotoryye Aktual'nyye Voprosy Biologii I Meditsiny (Russian), 3:204-206, 1974.

This paper presents the correlations between absolute concentrations of inorganic (bound with alkaline metals) sulfur with sex, color, race, and age of the individuals whose hair was tested. It was established that the mean level of inorganic sulfur was 2.0 to 2.3 times higher in all age groups of female hair than male hair. Therefore, the quantitative concentrations of inorganic sulfur in human hair are intrinsic features of sex.

Pierach, A.

Nachtarbeit und schichtwechsel beim gesunden und kranken menschen. (Night work and shift changes in healthy and sick people.) Acta Medica Scandinavia (German Supplement), 307:159-166, 1955.

The effects of night work and shift changes are presented from a clinical viewpoint. The author concludes that vegetative exhaustion with characteristic sleeplessness and constant fatigue, gastrointestinal troubles (especially stomach ulcers), and myocardial infarcts are found to a particularly great extent among night shift workers.

Philbert, M.

Le travail posté. (Shift work.) L'année du Médicin (French), 286-292, 1977.

The author discusses the different methods of shift work (continuous system, semi-continuous, and noncontinuous). The multiple effects (individual, family, social, vocational) of shift work and its pathogenic repercussions (sleep problems, neurovegetative difficulties, and digestive difficulties) are summarized.

The author feels that consideration should be given to general regulatory provisions on shift workers such as the need for closer medical supervision, stricter requirements regarding the mental stability of individuals to be assigned to shift work, exclusion of minors and pregnant women, elimination or closer supervision of all supplementary outside activities, establishment of special statutes for shift workers, facilities for vocational training and retraining, and lowering of retirement age to 55, or even lower, for individuals completing more than 20 to 25 years of shift work.

Pokrovskiy, A. A., K. A. Korovnikov, and B. V. Ottesen.

К ВОПРОСУ О МОЛЕКУЛЯРНОМ ВЕСЕ МНОЖЕСТВЕННЫХ ФОРМ ГЛЮКОЗО-6-ФОСФАТДЕГИДРОГЕНАЗЫ ПЕЧЕНИ И НАДПОЧЕЧНИКОВ КРЫС

(The problem of the molecular weight of multiple forms of glucose-6-phosphate dehydrogenase from rat liver and adrenal glands.) Voprosy Meditsinskoy Khimii (Russian), 23(3):327-332, 1977.

The possible reasons for the existence of two types of glucose-6-phosphate dehydrogenase (G6PD) in one organ are discussed. An estimation of molecular weights of the G6PD multiple forms was carried out by the method of extended electrophoresis (within 24 hours) in polyacrylamide gel with a linear gradient of concentration (from 3.5 percent to 30.0 percent). Proceeding from the variations in molecular weight, the multiple forms of G6PD, found in liver tissue and adrenal glands, might be apparently classified as two types, designated as α-G6PD and β-G6PD.

Popescu-Neveanu, El., M. Mamali, and P. Ene.

Aspecte ale oboselii operatorilor determinată de munca de noapte si munca în schimburi. (Aspects of operators' fatigue determined by night work and shift work.) Revista de Psihologie (Romanian), 3:345-366, 1966.

The authors aim to devise an optimum shift-rotation system. The changes in functional state and in work efficiency, both in the shifts as a whole and dynamically throughout the work cycle, are established by utilizing a number of methods. These include functional tests, photography of the workday, an analysis of the quality indices of production, and others.

Prokop, L., and G. Machata.

Höhere alkohole und äthanolwirkung beim menschen. (The effect of ethanol and higher alcohols on man.) Blutalkohol (German), 11:80-87, 1974.

The influence of ethanol and higher alcohols in humans is discussed. Blood alcohol concentration (BAC), the concentration of fusel oil in blood, and the individual reactions after consumption of vodka with and without addition of higher alcohols (n-propanol, iso-butanol, amylalcohols) of 30 testpersons were compared. A typical increase of the BAC was not proven. Generally, the higher alcohols were absorbed slowly and could be detected after 14 hours. The reaction ability, blood pressure, and pulse did not fall off distinctly compared with the tests without fusel alcohols, but the individuals experienced the typical negative symptoms of the "hangover syndrome."

Quaas, M.

Probleme der adaptation, leistungsfähigkeit und organisation der schichtarbeit in der DDR. (Problems regarding adaptation, productivity and organization of shift work in the GDR.) Proceedings of an International Symposium on Night and Shift Work (Oslo), pp. 112-123, 1/21-2/1/69.

The author reviews findings on circadian rhythms and productivity, age-specific characteristics, the effect of different types of work on productivity, working time problems (break periods, etc.) and shift work, the exceeding of contractual breaks, arbitrary breaks, and sleep and leisure time under shift work conditions.

The author states that the shift worker is in a state of permanent readaptation and offers two suggestions: (i) introduction of the longest possible shift schedules so as to avoid frequent readaptation, and (ii) establishment of the shortest possible shift schedules--thus reducing the night shift periods--in order to keep within limits the sleep deficit per unit of time. Nine measures for an optimal organization of shift work being prepared and implemented in East Germany are also listed.

Reinberg, A., A. J. Chaumont, A. Laporte, P. Chambon, G. Vincendon, G. Skouliso, N. Beauchart, A. Nicolai, Ch. Abulker, and J. Dupont.

Étude chronobiologique des effets des changements d'horaires de travail (autométrie de 20 sujets postés; système des 3 x 8 à rotation hebdomadaire). (Changes in circadian temporal structure (including sleep) of 20 shift-workers (8-hour shift-weekly rotation); A field study with autorhythmometry.) Archives des Maladies Professionnelles (French), 35(3):373-394, 1974.

Twenty healthy, adult men (from 25 to 48 years of age; mean = 34.5) working in an oil refinery were volunteers, performing self-measurements of physiological interest and collecting urine samples at work as well as at home. Shifts included normal day (ND), 0745-1630; night shift (night-S), 2100-0500 (next day); evening shift (evening-S), 1300-2100; and morning shift (morning-S), 0500-1300. The workers shifted every 7 days, in the sequence indicated above. The duration of a total

rotation was 31 days since night-S was followed by a 48-hour rest, evening-S by a 24-hour rest. A 4-day rest was included in the ND week.

As a rule, the morning-S was said to be the most exhausting one; the studied workers usually felt tired after a night-S. ND and evening-S were subjectively well accepted.

Each volunteer was studied during a 6-week period to document a complete rotation of shift and to avoid the interference of circannual rhythms. Information gathering, self-recorded time series, and urine collection took place on day 3 of the ND week, on day 1 and on day 7 of the three shifts.

The subjects were asked to record light-on and light-off (socio-ecologic synchronization; estimation of sleep duration) and quality of sleep (excellent, good, medium, poor, very poor). On each 24-hour test day at fixed clock hours $\pm$20 minutes (0100, 0500, 0900, 1300, 1700, 2100)--but not during sleep--the following variables were investigated: mood and physical vigor (self-rating), tempo, heart rate, eye-hand skill, oral temperature, peak expiratory flow rate, grip strength, systolic blood pressure, and urinary excretion of potassium, sodium, chloride, 17-OH corticosteroids, 17-ketosteroids, serotonin, and creatinin.

A control group of 10 healthy, adult men, working routinely on ND schedule without shift in the same oil refinery had a similar 24-hour test. Results obtained for this group were not statistically different from either that of shift workers when on ND and evening-S or that of healthy, adult men, documented by other authors. Food intake as well as timing of meals were not controlled.

Time series thus obtained were analyzed using the cosinor as the statistical method. Endpoint and confidence interval estimates for circadian acrophase, amplitude, and mesor (24-hour mean level) were computed transversally for each shift and each variable. Circadian temporal structure, as reflected by the timing of acrophases showed that (i) the most striking desynchronization corresponded to the night-S and (ii) the speed of the adjustment (from day 1 to day 7) as well as phase shift observed on day 7 differed from variable to variable. Acrophases of the studied variables clustered around the midwork clock hour in the ND as well as in the evening-S, while they clustered before midwork in the night-S and after midwork in the morning-S. Regarding mesor values (24-hour mean level) a statistically significant fall was detected only for mood and physical vigor self-rating during night-S. During morning shift, the mesor lowering of the same variables was not significant.

No statistically significant correlation between the quality and the duration of sleep was found. The percentage of sleep quoted as excellent or good was 83 in the ND, 82 in the evening-S, 60 in the night-S, and only 51 in the morning-S. This fall (checked by X^2 test) of the subjective quality of sleep during morning shift is possibly related to a deprivation of (paradoxical?) sleep in these circumstances. As a matter of fact, paradoxical sleep occurs mainly at the end of the sleep which might be suppressed here insofar as subjects are artificially awakened at 0350 (as a mean) when on morning-S. Thus, from this study, two kinds of fatigue related to shift working were considered; the first one expressed as an exhaustion and richly verbalized occurs during the morning shift and probably results from a sleep deprivation associated with a minor alteration of the temporal structure. The second

kind of fatigue, more subtle, and mainly revealed by the iterative self-rating of mood and physical vigor, occurred during the night shift and was presumably related to an alteration of the temporal structure (circadian dyschronism).

Rüdin, E.

Ueber die dauer der psychischen alkoholwirkung. (About the duration of the psychic effect of alcohol.) Psychologische Arbeiten (German), 4:1-44, 1901.

The effect of a single dose of alcohol in terms of its influence on psychic events is discussed. The following conclusions are drawn:

1. A substantial alcohol dose of 90-100 g administered to four different persons showed large differences as regards direction, strength, and duration of effects.

2. The effect of alcohol consisted generally in a slowing down of doing arithmetic addition, aggravation of learning, shortening of choice reaction times with an increase of false reactions, and an increase of associations which are preferably based on linguistic images.

3. The duration of alcohol action mostly amounted to 12 to 24 hours; on a few occasions, it lasted up to 48 hours. The shortening of choice reaction times disappeared most rapidly, then to be replaced by their prolongation with a continuation of false reactions.

4. Sensitivity to alcohol does not depend only on habituation to the poison; sensitivity can be low even after a very long period of abstention.

Rüdin, E.

Auffassung und merkfähigkeit unter alkoholwirkung. (Understanding and memory under the influence of alcohol.) Psychologische Arbeiten (German), 4:495-522, 1902.

The single administration of a major amount of alcohol of 100 cc causes a distinct effect in the perception of simple stimuli which shows a multiplicity of gradations in kind, strength, and duration, depending on individual differences. Accuracy, as well as extent of perception, is lowered on the perception drum (which exposed monosyllabic words and nonsense syllables) where after about 8 hours the restriction of perceptual extent exceeds that of the reliability of perception. On the Schussplatte, particularly the reliability of perception suffers, whether the amount of perceived material increases or decreases. The correct responses decrease; the falsely localized and freely invented replies increase as a rule. Frequently, the result seemed to be influenced by the greater readiness for motoric language ideas or facilitated production of inaccurate or false perceptions. Alcohol damages voluntary remembering and retention of simple stimuli (memory). Interference caused by alcohol grows with the difficulty of the tested activity. Reading of syllables suffers more than reading of words; memory more than pure perception. The damage begins earliest in the sixth and latest in the nineteenth minute after ingestion and lasts at least for 4 and at the most for 12 hours. A temporary improvement of perception and retention capacity under the influence of alcohol could not be established in any stage.

Rutenfranz, J.

Risikofaktor nacht- und schichtarbeit. (Risk factor-night and shift work.) Medizinische Klinik (German), 69:12-16, 1974.

The problem of night work as a health hazard and whether people adjust biologically to night and shift work are discussed. The author presents basic experiments to elucidate problems relating to shift work, disorders, and well-being in night work, analysis of sleep disturbances by experimental shift work, and specific diseases as a result of night work and shift work.

Rutenfranz, J., H. Mann, and J. Aschoff.

Circadianrhytmik physischer und psychischer funktionen bei 4- stündigem wachwechsel auf einem schiff. (Circadian rhythmic physical and psychic functions under 4-hour changes of watch on a ship.) Proceedings of an International Symposium on Night and Shift Work (Oslo), pp. 31-41, January 21-February 1, 1969.

This study was conducted to measure circadian periodicity of certain physical and psychic functions and to follow the effect of the shift system (a ship watch changed every 4 hours) on these functions. Other modes of behavior such as food intake and sleep were assessed. It was concluded that under continually irregular working conditions on board of a ship with 4 hours work every night, the circadian rhythm of body temperature, pulse frequency, and electrolyte excretion showed no difference from the days without night work. Thus, the functions measured indicated no adaptation to the changed mode of living. Night work had an obvious effect on sleeping time, which was particularly greatly shortened on certain days of the changing shift. This, in turn, led to longer reaction times at certain times of the day. Therefore, the shift changing scheme studied cannot be considered altogether optimal because of its tendency to produce chronic sleep deprivation.

Saller, K., and edited by R. Martin.

Systematischer darstellung mit besonderer berucksichtigung der anthropologischen methoden, Lehrbuch der Anthropologie. (A systematic presentation with special consideration of anthropological methods in Textbook of Anthropology.) Gustav Fischer Verlag-Stuttgart (German), Vol. 1, 1957.

Pages 554-578 of this text are translated. The topics covered include descriptions of the measurement techniques used in the pelvis, femur, patella, tibias, and fibula.

Sarkisov, I. Yu, and A. A. Shipov.

РАЗЛИЧИЕ РЕАКЦИЙ КУПУЛО-ЭНДОЛИМФАТИЧЕСКОЙ СИСТЕМЫ НА ФИЗИОЛОГИЧЕСКИЙ ПОВОРОТ ГОЛОВЫ В ЕСТЕСТВЕННЫХ УСЛОВИЯХ И УСЛОВИЯХ ВРАЩЕНИЯ

(Differences in reactions of the cupulo-endolymphatic system to physiological turning of the head under natural conditions and in the presence of rotation.) Izvestiya Akademii Nauk SSSR (Russian), Seriya Biologicheskaya, pp. 908-913, November-December 1974.

This paper presents the result of physicomathematical analysis of differences in reactions of the cupulo-endolymphatic system to physiological turning of the head under natural conditions and in the presence of rotation. Possible physiological consequences of such differences and the ways for reducing them to a minimum are discussed. The conclusions of this research are valid (within certain limits) for systems rotating at constant velocity (slowly rotating rooms, stations in which artificial gravity is created, and so on), both on earth and in weightless conditions.

Sato, S., and K. Takagi.

交替勤務制が食事に及ぼす影響についての統計的研究

(繊維工場における実態) (第3報)

(Studies on the effect of shift work on the meal-time (Part 3).) Journal of Science of Labor (Japanese), 48:283-287, 1972.

Subjects in the research were (i) unmarried female workers (working in two shifts) at five factories belonging to two textile firms in the Kansai area, and (ii) married male employees working the night shift. Their meal times, sleep schedule, number of meals eaten and their appetite changes in relation to their work schedule were surveyed. A two-meals-per-day pattern was most numerous among the second shift workers; over half the night shift workers surveyed ate four times a day. Workers on the first shift had the shortest sleep span; only half of them slept longer than 6 hours. The second shift workers slept nearly 7 hours. The night shift workers appeared to have difficulty getting enough sleep during the day and 70 percent had their sleep interrupted.

With regard to meal schedules, lunch and dinner for the first shift operators were taken within a relatively short interval; their supper hours are quite widely distributed. Lunch/dinner hour intervals for the second shift operators were not quite so short as for the first shift employees (they also ate breakfast at a somewhat later time). A pattern of dining out was seen for supper or for midnight meals; 12 percent of the first shift workers and 4 percent of the second shift workers dined out for these meals. Many night shift operators ate a midnight meal while on duty. The husbands breakfasted with company-provided food and thus the wives did not have to prepare their morning meal. A portion of the workers ate lunch with their wives. Almost all of them ate supper with their families.

Variations in appetite were reported as follows: the first shift workers had the heartiest appetite at breakfast; for second shift and night shift workers, supper was their best meal. Conversely, the first and second shift workers had their poorest appetite at lunchtime, and night shift workers found breakfast least appetizing. These differences were not very sizable, however.

Schubert, I.

Sozial-neuropsychiatrische untersuchungen bei schichtarbeitern. (Social and neuropsychiatric examination of shift workers.) Journal of the Society for Psychiatry and Neurology in the German Democratic Republic and the Society for Medical Psychotherapy in the German Democractic Republic, 16(2):55-60, 1964.

Examinations on shift workers from three different occupational fields revealed that a substantial percentage of night shift workers complained of troubles. However, only about half of them offered objective symptoms. Troubles of a predominantly functional "nervous" type are compared in regard to sex distribution and field of occupation. The author discusses the physiological variations in rhythm and points out predisposition factors, as well as the significance of adaptation and prophylaxis.

Schürmann, D., and P. Müller-Seitz.

Einige empirische untersuchungsergebnisse über schichtarbeitsprobleme in arbeitshygienischer sicht. (Some results of an empirical study of shift work problems with regard to occupational health.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz (German), 19(11):321-323, 1969.

This is a brief report on some results of a study of shift work problems on occupational health. It is concluded that the process of mechanization and automation in the modern economy results in an increasing trend toward shift work. The authors emphasize the need for occupational health suitability examinations.

Singer, R., and J. Rutenfranz.

Arbeitspsychologische studien über arbeitszufriedenheit und berufsbezogene gesundheitsstörungen bei fluglotsen. (Job satisfaction and job related health disturbances among air traffic controllers.) Internationales Archiv für Arbeitsmedizin (German), 30:135-160, 1972.

An inventory study was performed using 517 (80.3 percent) German air traffic controllers from all German civilian airports except Berlin and Saarbrücken. The inventory included 106 questions about job situation, job satisfaction, and subjective health status. The controllers completed the inventories in groups of 20 under the supervision of the test leader. It was found that the interest of the controllers in their work was particularly high but job satisfaction was particularly low if remarks about individual aspects of the job situation were accepted as a criterion. Reasons for low job satisfaction were: lack of opportunity for professional advancement, general working conditions, lack of appreciation by the administration, payment, and job load. The lack of job satisfaction was very closely related to health disturbances attributed to job situation; age and length of service were also involved. There is a discussion on whether lack of job satisfaction can cause or aggravate job-related health disturbances.

Stefenov, B., and I. Zlatarov.

О ВЛИЯНИИ ШУМА НА ПРОЦЕССЫ ПЕРЕРАБОТКИ ИНФОРМАЦИИ И НА ПРОСТУЮ ДВИГАТЕЛЬНУЮ РЕАКЦИЮ

(On the influence of noise on information processing and on a simple motor reaction.) Gigiena I Sanitariya (Russian), 27:84-86, 1972.

The authors present the correlation between noise intensity and the degree of change in indicators of information processing from the perspective of the urban environment. Also, changes in the functional state of the nervous system are noted.

In the reported experiments, a digital text was developed. The table contained 1,000 figures arranged randomly with each figure having a one in nine probability of appearing. Nineteen subjects (22-34 years) participated in performing the measured intellectual task (in the experiment) or did their usual job tasks (in production work) under the influence of wide-band noise of varying intensity (65, 75, 85, and 90 dBA). The noise lasted 1 hour. The authors conclude that under the influence of noise with intensities in the 75-95 dBA range, a tendency toward reductions in the speed of perceiving and processing information and deteriorations in work quality were observed. The changes were more significant as noise intensity increased during the performance of the mental tasks.

Tomilin, V. V., and B. M. Pikovskiy.

СУДЕБНО-МЕДИЦИНСКАЯ ЭКСПЕРТИЗА ПРИ ЛЕТНЫХ ПРОИСШЕСТВИЯХ

(Forensic medical expert testimony in airplane crashes.) Sudebno-Meditsinskaya Ekspertiza (Russian), 17:7-12, 1974.

The planning and execution of medico-criminalistic studies and their informative value in helping to find out the circumstances and causes of an aircrash are discussed. The necessity of collaboration of various specialists in the disaster squad is stressed.

Ulich, E.

Schicht- und Nachtarbeit im Betrieb. (Shift and Night Work in Industry.) Westdeutscher Verlag Koln und Opladen (German), 1964.

Adaptation of the work pace to the diurnal variations of working capacity and organizational and personnel-related measures aimed at overcoming the physical, psychological, and social stress caused by shift and night work are discussed. If one proceeds from the assumption that the general physiological working capacity varies according to the time of day and that the diurnal rhythms in humans generally do not adapt to changed living and working conditions, several conclusions in regard to industrial operating conditions suggest themselves. The object of this study is to discuss a number of proposals which appear to be scientifically well-grounded and which in practical tests have proved successful. The measures proposed are likely to help conserve manpower and at the same time adequately increase its efficiency.

Ulich, E.

Bemerkungen zur frage der adaptation an schicht- und/oder nachtarbeit. (Observations on the problem of adaptation to shift and/or night work.) Proceedings of an International Symposium on Night and Shift Work (Oslo), pp. 108-111, January-February 1, 1969.

Under the practical conditions of industrial production, the author considers attempts to effect an adaptation to modes of life deviating from the norm--involving, e.g., night work and daytime sleep--to be neither promising nor desirable. Rather, he recommends shift arrangements which do not hypothesize any adaptation. Problems concerning adaptation to shift and/or night work relating primarily to physiological and psychological circumstances are discussed.

Van Loon, J. H.

Enkele physiologische aspecten van het werken in ploegendienst. (A few physiological aspects of working in shifts.) Mens en Onderneming (Dutch), 12:347-356, 1958.

This paper presents physiological aspects of the 24-hour rhythm and some changes (body temperature, pulse frequency, blood pressure, breathing, diuresis, various glandular functions, number of leukocytes, etc.) which occur in it. The influence of changes in the life pattern produced by shift work is given and tentative conclusions regarding night shifts and their duration are made.

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