

Surgeon General's Conference on Agricultural Safety and Health  
 FARM SAFE 2000 • A National Coalition for Local Action  
 Convened by the National Institute for Occupational Safety and Health  
 April 30 – May 3, 1991, Des Moines, Iowa

## ACRONYMS

2,4-D	2,4-dichlorophenoxyacetic acid	C	celsius
4-H	A program of informal education for youth	CAHSPS	California Agricultural Health and Safety Promotion System
ABC	Always Be Careful	CAST	Council on Agricultural Science Technology
AC	Amanda-Clearcreek	CATI	computer-assisted telephone interview
ACTION	Domestic Volunteer Service Agency	CDC	Centers for Disease Control
AFC	antibody-forming cells	CDFA	California Department of Food and Agriculture
AFT	antibody-forming cells	CE	California encephalitis
AG-LINK	a crisis hotline	CEHIC	Center for Environmental Health and Injury Control
AGI	Ace Glass Impinger	CES	Cooperative Extension Service
AHPS	Agricultural Health Promotion Systems	CFM	cubic feet per minute
AIDS	Acquired Immune Deficiency Syndrome	CFR	Code of Federal Regulations
ALAI	American Lung Association of Iowa	CFU	colony forming units
ALIVE	Aware Leaders Instilling Vital Education	CIEP	counterimmuno-electrophoresis
AM	alveolar macrophage	CI	cellular infiltrate
ANSI	American National Standards Institute	C.I.H.	Certified Industrial Hygienist
ARHES	Agricultural Respiratory Hazards Education Series	cm	centimeter(s)
ASAE	American Society of Agricultural Engineers	CNS	central nervous system
ASCS	Agricultural Stabilization and Conservation Service	CO	carbon monoxide
ATSDR	Agency for Toxic Substances and Disease Registry	CO <sub>2</sub>	carbon dioxide
ATV	all terrain vehicle	CPR	cardio-pulmonary resuscitation
AU	<i>Aspergillus umbrosus</i>	CPSC	Consumer Products Safety Commission
B.A.	Bachelor of Arts	CSP	Certified Safety Professional
B.S.	Bachelor of Science	CTL	cytotoxic T lymphocyte
B.S.N.	Bachelor of Science in Nursing	DARE	Drugs and Resistance Education
B2	a carcinogenic level	dB(A)	decibels (A-weighted scale)
BAL	bronchoalveolar lavage	DBBS	Division of Biomedical and Behavioral Science
BALF	bronchoalveolar lavage fluids	DBCP	dibromochloropropane
BLS	Bureau of Labor Statistics	DCC	day care center
BRFSS	Behavioral Risk Factor Surveillance System	DDT	dichlordiphenyltrichloroethane
		DFR	dislodgeable foliar residue
		DHHS	Department of Health and Human Services
		DLCO	low diffusing capacity for carbon monoxide

## Acronyms

DNA	deoxyribonucleic acid	FDA	Food and Drug Administration
DOL	Department of Labor	FEV	forced expiratory volume
DOT	Department of Transportation	FEV1	forced expiratory volume in one second
DPS		FEV1FVC	forced expiratory volume in one second, forced vital capacity
DPSE	Division of Physical Sciences and Engineering	FFA	formally, Future Farmers of America
DRDS	Division of Respiratory Disease Studies	FFHHS	Farm Family Health and Hazard Survey
DSDTT	Division of Standards Development, and Technology Transfer	FHA	Federal Housing Administration
DSHEFS	Division of Surveillance, Hazard Evaluations, and Field Studies	FHA	Future Homemakers of America
DSR	Division of Safety Research	FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
DTH	delayed-type hypersensitivity	FLD	farmers lung disease
DTMD	Division of Training and Manpower Development	FTA	Free Trade Agreement
D.V.M.	Doctor of Veterinary Medicine	FVC	forced vital capacity
EACH	Essential Access to Community Hospitals	FY	fiscal year
E-Codes	injury and poisoning codes, external cause	g	gram(s)
EC	electron capture	GATT	General Agreement on Trade and Tariffs
EDB	ethylene dibromide	GC	gas chromatography
EEE	Eastern equine encephalomyelitis	GFCI	ground-fault circuit interrupter
EEG	electroencephalogram	GLC	gas-liquid chromatography
ELISA	enzyme-linked immunosorbent assay	GSDE	grain sorghum dust extract
EM	electron microscopy	H <sub>2</sub> S	hydrogen sulfide
EM	equipment maintenance	HAZMAT	hazardous materials
EMI	Equipment Manufacturers Institute	HAZOP	hazard and operability
EMS	emergency medical services	HERO	home economics related organization
EMT	emergency medical technician	HFS	Human Factors Society
EPA	Environmental Protection Agency	HHS	Health and Human Services
ESA	Employment Standards Administration	HIV	human immunodeficiency virus
ETC	emergency transmatic cars	HP	hypersensitivity pneumonitis
EU	endotoxin units	I-CASH	Iowa Center for Agricultural Safety and Health
EVA	extravehicular activity	IA-HASSP	Iowa Agricultural Health and Safety Services Project
FACE	Fatal Accident Circumstances and Epidemiology	IARC	International Agency for Research on Cancer
FaRM	Farm Family Rehabilitation Management	ICD	International Classification of Diseases
FARS	Fatal Accident Reporting System	ICD-9	International Classification of Disease - 9th Revision
FAX	faximile	IDPH	Iowa Department of Public Health
FBLA	Future Business Leaders of America	IEA	International Ergonomics Association
		IgE	reagin antibodies
		IgG	precipitating antibodies

IH	International Harvester	NEISS	National Electronic Injury Surveillance System
IHS	Indian Health Service	ng	nanogram(s)
IL-1B	interleukin 1B	NH <sub>3</sub>	ammonia
IOM	Institute of Medicine	NHL	non-Hodgkin's lymphoma
IPM	integrated pest management	NHTSA	National Highway Traffic Safety Administration
IRCA	Immigration Reform and Control Act	NIEHS	National Institute of Environmental Health Science
ISO	International Standards Organization	NIFS	National Institute for Farm Safety
ISU	International Standards Units	NIH	National Institutes of Health
l	liter(s)	NIOSH	National Institute for Occupational Safety and Health
LELA	organization of the machine manufacturers in Sweden	NIPCC	National Injury Prevention and Control Committee
LPHS	Lake Placid High School	NITS	National Institute for Technology and Standards
LRT	lower respiratory tract	NL	nasal lavage
m	meter(s)	NOES	National Occupational Exposure Survey
M.A.	Master of Arts	NOHS	National Occupational Hazards Survey
MADD	Mothers Against Drunk Driving	NRHA	National Rural Health Association
M*A*S*H	mobile army surgical hospital	NSC	National Safety Council
M.B.A.	Master of Business Administration	NTOF	National Traumatic Occupational Fatalities
MFW	migrant farm worker	NTP	National Toxicology Program
mg	milligram(s)	OATS	Olmsted Agricultural Trauma Study
ml	milliliter(s)	OBGYN	obstetrician gynecologist
MLC	mixed lymphocyte culture	OD	over dose
MMFR	maximum mid-expiratory flow rate	ODTS	organic dust toxic syndrome
M.P.A.	Master of Public Administration	OMB	Office of Management and Budget
M.P.H.	Master of Public Health	OR	operating room
M.S.	Master of Science	ORD	occupational respiratory diseases
M.S.F.	Master of Science in Forestry	ORHP	Office of Rural Health Policy
MSHA	Mine Safety and Health Administration	OSG	Office of the Surgeon General
n	number	OSHA	Occupational Safety and Health Administration
NACHO	National Association of County Health Officials	OSU	Oklahoma State University
NAFTA	North American Free Trade Agreement	PAS	Post-secondary Agricultural Student Organization
NBC	National Broadcasting Corporation	PAT	pesticide applicator training
NCASH	National Coalition for Agricultural Safety and Health	pCi	picocurie(s)
NCHS	National Center for Health Statistics	PDR	Physician's Desk Reference
NCI	National Cancer Institute	PEACH	Primary Care Hospitals Essential Access to Community Hospitals
NCSU	North Carolina State University	PEL	permissible exposure limit
NEANES	National Health and Nutrition Examination Survey		
NEC	National Electric Code		

## Acronyms

Ph.D.	Doctor of Philosophy	SPRAINS	Sentinel Project Researching Agricultural Injury Notification Systems
PHA	phytohemagglutinin	STD	sexually-transmitted disease
PHA	process hazard analysis	STEL	short-term exposure limit
PHD	Panhandle Health District	Syn.	synonym
PHS	Public Health Service	TB	tuberculosis
PMN	polymorphoc neutrophils	TCE	trichloroethylene
PMR	proportionate mortality ratio	TLC	total lung capacity
PPE	personal protective equipment	TLV	threshold limit value
PRIST	paper radio immunosorbent test	TSCA	Toxic Substances Control Act
PSA	Public Service Announcement	TTS	temporary threshold shift
PTO	power take-off	TV	<i>thermoactinomyces vulgaris</i>
PTS	Permanent threshold shift	TV	television
PUD	Public Utilities Department	U.C.	University of California
PV	Park View	UNDP	United Nations Development Program
RAST	radioallergosorbent test	URT	upper respiratory tract
RD	respiratory disease	U.S.	United States
R.D.	Registered Dietician	USDA	United States Department of Agriculture
REC	Rural Electric Cooperative	USEPA	United States Environmental Protection Agency
REL	recommended exposure limit	UTI	urinary tract infections
RFP	request for proposal	VA	Veteran's Administration
R.N.	Registered Nurse	VAF	virus, antigen free
ROPS	roll-over protective structure	Vo-Ag	vocational agriculture
RRIS	Regional Rural Injury Study	WC	workers' compensation
SADD	Student Athletes Detest Drugs	WEE	western equine encephalitis
SAE	Society of Automotive Engineers	WHO	World Health Organization
SAW	Special Agricultural Worker Program	WIC	Women's, Infant's, and Children's
Sc.D.	Doctor of Science	YISD	Ysleta Incorporated School District
SDS	Supplementary Data System	$\mu\text{m}$	micrometer(s)
SEM	scanning electron microscopy		
SLCA	static lateral critical angle		
SLE	St. Louis encephalitis		
SMR	standardized mortality ratio		
SMV	slow-moving-vehicle		

## METRIC SYSTEM OF WEIGHTS AND MEASURES <sup>1</sup>

### INTRODUCTION

Use of metric measurement standards in the United States have been authorized by law since 1866. In 1988, the Congress enacted legislation (Public Law 100-418) to establish the metric system as the preferred system of weights and measures for all domestic trade and commerce. This legislation also required the use of metric measurement standards in all Federal activities. Recently, the President issued Executive Order 12770 on July 25, 1991 reiterated the order to implement the metric system "as the preferred system of weights and measures for United States trade and commerce." This executive order directs all Federal agencies to implement "metrification," to the extent economically feasible, by September 30, 1992.

### THE METRIC SYSTEM

Originally, there were only two basic reference points, the meter and the gram. The list of reference points has been expanded or changed to include the kilogram (instead of the gram) for mass, the second for time, the ampere for electric current, the degree Kelvin for temperature, and the candela for light intensity.

The reference objects for these International Standards Units are maintained for comparisons and checked periodically against other international references by the National Institute for Technology and Standards (NITS).

The *metric* system entails the use of multiples or power of ten to describe magnitudes greater or lesser than the basic units of meter, gram, ampere, and so forth. For example, the kilogram is 1,000 grams and the *milligram* is 1/1,000th of a gram. There are 100 *centimeters* (0.39 inches) to one *meter* (1.09 yards) and 1,000 *meters* to

**Table I.** Prefixes and Symbols for Decimal Multiples and Submultiples of Units.

Power of Ten	Prefix	Symbol
10 <sup>12</sup>	tera	T
10 <sup>9</sup>	giga	G
10 <sup>6</sup>	mega	M
10 <sup>3</sup>	kilo	k
10 <sup>2</sup>	hecto	h
10 <sup>1</sup>	deca*	da
10 <sup>-1</sup>	deci	d
10 <sup>-2</sup>	centi	c
10 <sup>-3</sup>	milli	m
10 <sup>-6</sup>	micro	μ
10 <sup>-9</sup>	nano	n
10 <sup>-12</sup>	pico	p
10 <sup>-15</sup>	femto	f
10 <sup>-18</sup>	atto	a

\*Also "deka."

Source: Conférence générale des Poids et Mesures, Comptes rendus des séances de la 11e Conférence générale des Poids et Mesures, Paris 1960, Gauthier-Villars, Paris, 1961, page 87; Conférence générale des Poids et Mesures, Comptes rendus des séances de la 12e Conférence générale des Poids et Mesures, Paris 1964, Gauthier-Villars, Paris, 1964, page 94.

<sup>1</sup>Adapted from OSHA Instruction CPL 2-2.20B CH-1, pp. 23-1 to 4.

**Metric System of Weights and Measures**

one *kilometer* (0.62 miles). The prefixes for the multiples and submultiples applied as multiples (power) of ten is presented in Table I.

**CONVERSION EQUIVALENTS**

The document to be used as a primary reference for inch-pound to metric conversions is Federal Standard 376A, *Preferred Metric Unites for General Use by the Federal Government*, May 5, 1983. A selected number of conversion factors are presented in Table II as examples.□

**Table II. Prefixes and Symbols for Decimal Multiples and Submultiples of Units.**

<b>Length</b>	<b>Pressure</b>
2.54 centimeters (cm) = 1 inch (in)	3.38638 kilopascals (kPa) = 1 inch of mercury (in Hg)
25.4 millimeters (mm) = 1 in	2.98898 kPa = 1 foot of water (ft H <sub>2</sub> O)
0.3048 meters (m) = 1 foot (ft)	0.1 kPa = 1 millibar
1.609344 kilometers (km) = 1 mile (mi)	
<b>Area</b>	<b>Volume</b>
6.4516 cm <sup>2</sup> = 1 in <sup>2</sup>	0.02831685 m <sup>3</sup> = 1 ft <sup>3</sup>
645.16 mm <sup>2</sup> = 1 in <sup>2</sup>	28.31685 liter (l) = 1 ft <sup>3</sup>
0.0929034 m <sup>2</sup> = 1 ft <sup>2</sup>	3.785412 l = 1 gallon (gal)
4046.873 m <sup>2</sup> = 1 acre	0.1589873 m <sup>3</sup> = 1 barrel (42 gal) (bbl)
2.589998 km <sup>2</sup> = 1 mi <sup>2</sup>	1233.489 m <sup>3</sup> = 1 acre-foot
	0.002359737 m <sup>3</sup> = 1 board foot (bd ft)
<b>Velocity</b>	<b>Weight (Mass)</b>
0.3048 meters/second (m/s) = 1 foot/second (ft/s)	0.45359237 kilogram (kg) = 1 pound (lb)
1.6093478 km/hour (km/h) = 1 mile/hour (mi/h)	28.34952 grams (g) = 1 ounce (oz)

## THE SURGEON GENERAL'S CONFERENCES ON OCCUPATIONAL HEALTH <sup>1</sup>

By Anne Mather

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The recognition that work can cause disease and disability may be as old as mankind. But the belief that government should try to prevent occupational affliction is not. The Public Health Service (PHS) played an integral part in this shift in perception.

The year was 1925. For the past two years, newspapers, particularly The New York World, had been carrying stories about cases of severe poisoning among chemists and other workers.

The source of the poisoning was tetraethyl lead, a new compound used in gasoline as an anti-knock agent. Within 17 months of its first manufacture in the United States, 139 cases of poisoning occurred; 13 people were dead.

In her autobiography, Dr. Alice Hamilton, a pioneer in industrial toxicology (she was the first U.S. physician to devote her career to occupational safety and health), describes the effects of this poison on the body: *it is more quickly absorbed than any of those ordinarily used in the central nervous system, causing insomnia, excitement, twitching muscles, hallucinations like those of delirium tremens, even maniacal attacks and convulsions, and death.*

It was a true emergency, one met by then—Surgeon General Hugh S. Cumming. On May 5, 1925, he requested the industry to discontinue temporarily the manufacture and distribution of tetraethyl lead. Industry complied. On May 20, Cumming called a conference to discuss the problem. Attending were industrialists, chemists, representatives of labor and physicians. They names an expert committee to recommend ways to prevent poisoning from tetraethyl lead.

A case-control study of 252 persons led to a conclusion that the hazards of this form of lead could be prevented by mechanical devices. When Surgeon General Cumming held another conference in 1926, the first cooperative agreement on toxic substances was reached.

The agreement included restrictions on the use and handling of tetraethyl lead. These regulations were subsequently administered by the Office of Industrial Hygiene and Sanitation, the predecessor of the National Institute for Occupational Safety and Health.

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<sup>1</sup>Adapted from *Dateline: CDC* article, Vol. 22, No. 9, October 1989, p. 12, written by Anne Mather and edited by Mary Guinan, M.D., Ph.D., Assistant Director for Science.

## The Surgeon General's Conferences on Occupational Health

As a result, several states made lead poisoning a reportable disease. Reporting continued until World War II.

These conferences were so successful that they became the model for another one, in 1928, on the health hazards of radium dial painting. Radium was also a new poison. It was used to make the luminous dials on watches and clocks. The habit workers had of pointing the tips of the brushes with their lips led to numerous fatalities.

So successful were these early conferences that a total of 9 were ultimately held—the last in 1941 under Surgeon General Thomas Parran. They concerned methanol, carbon tetrachloride and similar volatile chlorinated liquid hydrocarbons, carbon tetrachloride fire extinguisher, aniline oil, carbon disulfide, benzol, and chronic mercurial poisoning in the hatting industry. They resulted in agreements between industry including labor, where appropriate, and PHS.

Wrote Hamilton,

*It was to me both surprising and heartening to see men of such widely separated backgrounds and interests—manufacturers and their chemists and research workers on one side, trade-union officials, independent physicians, and toxicologists on the other—meet in a spirit of reasonableness and a genuine desire to get at the real facts and deal practically with the problem.□*



## EXCERPTS FROM *DISEASES OF WORKERS*<sup>1</sup> By Bernardino Ramazzini

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### DISEASES OF FARMERS

*O FARMERS*, too blest by Fortune, did they but know their bliss!" This cried the prince of poets of old. And perhaps we may say as much of that pristine race of mortals that used to till their ancestral acres with their own oxen, but not nowadays of our farmers, for they have to wrestle with unending toil and the direst poverty on another man's estate. The diseases that commonly attack the peasantry, in Italy at least, and above all in the country on both sides of the Po, are: Pleurisy, pneumonia, asthma, colic, erysipelas, ophthalmia, quinsy, toothache, and decay of the teeth. The exciting causes of these maladies are in the main two, the weather and unwholesome food. While they work in the fields they are exposed to the inclemency of the weather; they are buffeted now by the south wind now by the north, soaked with rain and night dews, scorched by the summer sun; however robust they may be, of however hardy a stock, they cannot support such violent changes; now they are in a bath of sweat, now chilled through, and besides they live on such unwholesome food that they accumulate a stock of thick glutinous humors which bring in their train a host of troubles. For the whole mass of humors is excited to a febrile effervescence, and thus in the vessels of the lungs into which flows all the venous blood, thick and viscid humors readily stagnate. This is why, as I have often noticed, whenever an epidemical constitution of lung diseases begins to assault us, it gives the signal to attack first the country-people and completely dominated them. Also from the same causes they very often suffer from the pains of colic and from hypochondriasis; the latter they call 'the master's disease', because this sort of affection seems to savor somewhat of hysterical trouble; their coarse and sticky food produces in the stomach and intestines a serious accumulation of pituitous and acid juice; hence ensue griping pains and distension of the intestines. Their agricultural work, since it is determined by differences of localities and the variations of the seasons, is various and of many kinds; thus in winter and early spring they suffer from diseases of the chest, fluxes to the eyes, and quinsy. These ailments are caused, as I have said, by their viscid and thick blood which makes the circulation sluggish so that the blood stagnates easily and in various parts excites inflammations; in fact, when blood is drawn from them by venesection at this season, it is so thick that both in density and color it resembles beeswax.

In my opinion there is no class of men whose blood undergoes such a great change and in so short a time as happens with these country-people; if you draw blood from them in

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<sup>1</sup>Courtesy of the New York Academy of Medicine Library. Translated from the Latin text *De Morbis Artificum* of 1713 by Wilmer Cave Wright. Published under the auspices of the Library of The New York Academy of Medicine, Hafner Publishing Company, New York, London, 1964, Chapter XXXIX, pp. 337-351, Chapter XL, pp. 353-357, and Chapter VI, pp. 441-443.

spring it may be thick and glutinous, but if in early summer some disease gives occasion for venesection of those same persons, the blood looks lively and bright red. Exercise and hard work have so powerful an effect that in so short a time the mass of humors in transformed to a quite opposite crasis; but in the case of townspeople this is not observed.

I have often noticed a curious thing that happens to our peasantry, especially to the children. In March, about the equinox, children under the age of ten or thereabouts are affected with remarkable dimness of vision; in the daytime they can see but little or almost nothing, and as they run about the fields they wander and lose their way just like blind people; but when night comes they can see fairly well. The affection passes off of itself without any remedy, and about the middle of April their former keenness of vision is entirely restored. I have often examined the eyes of these children when I had a chance and noted that the pupil was excessively dilated. This affection is called by doctors 'mydriasis', but in discussing its cause writers are by no means in agreement, as you may see by consulting Sennert, Riviere, and Platter. De Gorris states that this disorder is not unlike paralysis of the pupil; and my own view is that the sun's rays in March may cause some liquefaction in the brain and visual nerves; this so weakens the tonus of the uvea, the tunic of the eye, that it collapses. These children spend the whole winter in extremely warm damp stables, and when the winter breaks up, which happens about the equinox, they sally forth from these dens and expose their bare heads to the sun's rays; this is very liable to cause a diffusion of the humors followed by dilation of the pupil and a consequent weakness of vision due to the admission of such intense light. Towards the end of April, the influx of humors has been effectually dispersed by the sun's rays, the pupil contracts and is restored to its natural tension, and so without any remedy the eyesight is completely restored.

*O Furthermore*, in summer farmers are very often attacked by acute and ardent fevers, especially when the wrath of 'raging Leo' begins to scorch them. In autumn they are subject to dysentery, and this we may ascribe to their eating the fruits of the season and to other errors of diet. Autumn is the regular time for them to steep hemp and flax in the pools of the marshes. This task is generally assigned to women, who, in order to drag out the bundles of hemp and clean them, wade up to the waist in lakes and pools; as a result of this filthy task many of them are attacked by acute fever, which is very quickly fatal; we may suppose that this is caused not only by constriction of the pores of the skin and checked transpiration but also by the fact that the animal spirits are utterly destroyed by that terrible pestilential stench which pollutes the whole neighborhood. This above all others is the season when city folk are cautious and with good reason about paying country visits; for then from every farm there comes a disgusting odor. Father Kircher considers that this odor alone is the cause of the highly malignant plague that certain cities have experienced from time to time. Schenck in his *Observations*, Pedro 'a Castro, Simon Paulli, and others fully demonstrate the virulent quality of the vapors that rise from the water in which hemp has been steeped. As for the influence of smells, whatever it may be, women who are subject to fits of hysterics know well how powerful it is. Another thing that seriously injures the health of farmers is their careless habit of piling dung for manuring the fields; they place these heaps in from on the

cowhouses and pigsties and even their own houses, which may truly be called Augean stables, and keep them there all through the summer, for a nosegay, and inevitably the air is polluted by the foul effluvia that incessantly rise from them. For this reason Hesiod disapproved of manuring the fields and desired that farmers should consider their own health rather than the fertility of the soil.

Paolo Zacchias remarks that gardeners very often suffer from cachexy and dropsy; this is because they have to keep watering the gardens and are obliged to spend their time on ground so damp that their bodies cannot fail to absorb a great deal of moisture. I remember the case of a patient of mine, a kitchen-gardener, who had become partly paralysed; he had entirely lost the use on one of his legs, through its sensibility was not impaired; in the other leg there was no sensation but its motility was not affected; by taking a decoction of guaiacum and many other remedies, for several years, he finally recovered. Hippocrates records a case which I will quote: "A man who lay ill in the garden of Dealcis had heaviness in the head and pain in the right temple for a long time. He caught fever from some exciting cause, and took to his bed." In his comment on this case history, Galen flares up against Sabinus who held that the word 'garden' had been interpolated in the text of Hippocrates; as though in Galen's view this indicated the real occasion of the disease; certainly Galen seems to have condemned the air of gardens on account of the manure and the pernicious exhalations from trees, e.g. box, and from similar plants. Those who live near meadows are also subject to the aforesaid diseases, for meadows nearly always make the air unhealthy for the same reasons. Hence we find in Zacchias under *Furisconsults: Meadow and what the word signifies*, that an action may lie against a neighbor who intends to convert arable land into pasture. It follows that those who work in meadows, for instance mowing hay, suffer from serious disorders.

Now what can the medical profession do to protect these tillers of the soil whom we need so much? To suggest to our farmers in Italy any precautions of a medical sort that might safeguard them seems little short of absurd since they seldom or never consult doctors about this and when one does make some suggestion they pay no attention. All that I can do is to offer certain warnings as to their treatment that it would be well to heed whenever they are brought to the city and are laid up in a hospital with any of the maladies I have mentioned, or when they do call in a doctor, as happens now and again when they can well afford it. My first warning, then, is that in cases of pleurisy or other diseases of the chest you must not draw blood as freely as you would from townspeople; for their bodies are worn out by unremitting toil, and it takes very little to bring on collapse; moreover, their blood is almost wholly of a gelatinous consistency, and its volatile elements have been used up; hence if an excessive amount of blood is drawn from them their strength collapses, and they are unable to wash out the disease by expectoration or vomiting. I am well aware that there are some who think that we ought to resort to more drastic venesection when the blood is seen to be so thick, for this, they say, would stimulate the circulation; but this is easily said. They should consult the learned Bellini and see with what caution one must proceed when one tries by venesection to remove blood from some part to which there has been an excessive flow. This at least is certain, that the blood does not flow through its channels of its own accord and by the force of its own gravity; it is the spirits that supply the driving force,

aided by the action of the heart; so that if the spirits are enfeebled, instead of stimulating the circulation of the blood you make it slow down still more.

Baillou raises this question: The bodies of servants, men and women alike, are in other respects hard, compact, and soiled and their health is not so easily upset as that of the gentry; why then when they are ill are they more easily upset as that of the gentry; why then when they are ill are they more easily prostrated by purging and venesection than are persons whose bodies are less compact and more delicate? Of the various reasons that he offers for this, the most important is that their bodies are so thick and distended by hardened viscera that they do not easily yield to purgatives, nor do they derive much benefit from phlebotomy; we may say the same of country-people. Hippocrates too describes a certain constitution in which all the female slaves who were attacked by quinsy died of it, whereas it was not fatal to free-born maidens. It follows that in diagnosing diseases and applying treatment you should take into account not only the bodily habit of the patients but also their mode of life and occupations.

Many indeed are the mistakes that to my knowledge are made in treating these country-people, simply because on account of their robustness they are supposed to be able to stand stronger remedies than the townsfolk. Often enough, and always with compassion, I see poor peasants brought in to the public hospitals and handed over to young doctors just out of the medical school; I see their strength utterly exhausted by powerful cathartics and repeated phlebotomy, with no attention paid to the fact that they are unaccustomed to strong remedies or that their strength is enfeebled by the fatigues they have undergone. This is why so many of them prefer to face death in their huts rather than take leave of this life in a hospital after their veins have been drained of blood and their bellies emptied and exhausted by drugs. Every year when the harvest is over in the Roman Campagna, the hospitals of Rome fill up with reapers who have fallen sick; and it is a question which cuts off more reapers, the scythe of Death or the surgeon's lancet.

I must say that I have often had cause to wonder how so many of these people when attacked by acute diseases managed to recover, I do not say without the aid of any remedy, for that would not surprise me, but on a rich and even sumptuous diet; for however poor these farmers may be, when one of them falls sick the neighbors hasten to bring them eggs and chickens with which they make dainty dishes, and in this way they either manage to defy the virulence of the disease or to hasten their release from the life of toil and trouble that they lead; so that with us it has come to be a common saying that the peasant class when death takes them to himself pass over well nourished and with full bellies; but the city folk perish miserable of hunger and starvation while the doctors torture them.

But when the former begin to recover, they go back to their regular diet of garlic and onions and devour them greedily as one would sweetmeats, and moreover they consider them a strengthening food. I can well believe that that acrid sort of aliment may answer the purpose of a medicament, for their stomachs and the whole blood mass tend to sourness, especially in the autumn after the summer's work is finished, and so onions and

garlic, like other anti-scorbutic remedies, will serve to dissolve that viscid substance and to correct acidity. I know many of them who have driven off quartan fevers by a diet of garlic and onions with strong wine in mid-winter.

Galen records the case of a rustic who was seized the colic pains and cured himself in the following way: He tightened his belt, then devoured garlic and bread and exercised himself by keeping at his usual work all day; by these means he got rid of the pain of colic. "I should therefore", says Galen, "call garlic the peasant's theriac, and anyone who forbids Thracians or Gauls, in short those who live in cold countries, to eat garlic will be giving them harmful advice." Another remedy that our farmers use to cure colic is this; they take the leaves of ground-pine, pound them, and with yolks of eggs make a poultice and apply it to the abdomen.

In Hippocrates is a curious case history form which I quote: "There are certain postures that give relief, e.g. the man whose work was plaiting and twisting twigs with his hand; the pain was such that he took to his bed; but he seized the top of a pole that was fixed above this head, gripped it firmly and the pain was relieved." Hippocrates does not say in what part the pain was, and Galen in his note on the passage thinks it was in the hand; but Valles decides that the pain was most violent and was piercing him as if with something pointed, he placed the end of a wooden pole and pressed hard on it; for pains of this sort are, he says, much relieved, "by strong pressure, by tossing the body about and changing one's posture." This is just what nature teaches us when we have a stomach-ache, namely, that we should press hard with the hand or fist on the painful part; this prevents it from becoming distended and swelling up. That is why Hippocrates recommended pressure with the hand when women have fits of hysterics, so that the womb might be kept in its proper place, and I have often found this sort of remedy very effectual, in fact much more than the whole outfit of remedies for hysterics.

I could write at much greater length on the proper treatment of these farmers, but let me sum up: As far as we may gather from actual experience and from sound reasoning, since they are enfeebled by constant toil and ill-nourished from an unwholesome diet, we must not exhaust their bodies by copious and repeated blood-letting and purging; emetics they can stand more easily, cupping with scarification in continuous fevers very often gives wonderfully good results, whether because they have great confidence in this remedy or perhaps because of some other factor of which we know nothing. When it is necessary to administer some sort of antidote, let it be chosen from the class that are volatile; this will be in conformity with nature, for they are accustomed to sweating not only in summer but in winter too; for men who exercise constantly always sweat easily. When they no longer have to battle with disease and are beginning to convalesce, they should be allowed to return to their poor homes and to resume the diet to which they are accustomed. Plato was quite right in ridiculing the physician Herodicus for wanting to prescribe rules of diet for artisans.

It follows that in my opinion men of this class should be treated by the direct and summary method; any other that is roundabout and calls for an outfit of various sorts

gradually consumes the strength of these peasant folk: "Who seeks to cure, but makes it worse."

## DISEASES OF FISHERMEN

*O FARMERS* plough the earth and sow and thus by plenteous crops supply food to the population, so fishermen plough the seas and rivers and by catching fish greatly contribute to the food supply and furnish dainties for the table. For the mainland would not suffice to feed such vast multitudes if the seas did not reinforce it with a supply of fish. Thus when the price of grain is high, coastal cities and seaports suffer less than inland towns and districts. We know that there are certain peoples called Ichthyophagi, because their only food is fish, e.g. those who live near the Red Sea, who broil fish on stones made red-hot by the sun and thus they make bread. Medicine therefore, which as Hippocrates says comes to the aid of all men, ought to take as much care of fishermen as of farmers whenever, as very often happens, they fall ill. Now when a doctor happens to have some fisherman entrusted to his care, let him carefully consider that theirs is a very toilsome and exacting calling; that the man has to endure the cruel buffets of the winds, freezing cold in winter, and in summer scorching heat; he should consider what kind of food he eats and how irregular is the sort of life he leads, so that, while other workers when wearied by the day's toil go to their homes and spend the night in comfort in their beds, restoring their strength by sleep, for fishermen the night is usually spent in toil and sleepless. Thus the Apostles complained to our Saviour that they had toiled the whole night and taken nothing. Pitable therefore is the lot of these workers, for since they very often have no other home than a small boat, when they fall ill they are obliged to go into a hospital, where it is impossible to enter on the precise and proper treatment for them unless the doctor knows clearly in what sort of occupation the patient is engaged.

The clothes of fishermen are always wet through, hence they are exposed to diseases that arise from obstruction of transpiration; such are acute fevers, chest troubles, pleurisy, pneumonia, coughs, dyspnoea, and similar diseases. They live mainly on fish, and of the inferior sort, since the better kinds are reserved for the tables of men of rank, as in the story of that huge turbot about which Juvenal wrote his Fourth Satire; this diet produces in them a cachectic habit, which ends in dropsy. There is a saying of Hippocrates: "Food too weak to nourish has a brief life"; that means, according to the admirable note of Valles, that if you want to prolong your life such food will not help much. Hence Lievin Lemmens was right in saying that if you eat fish you need to eat more bread because fish very quickly putrefies. These men spend all their time in places that are very damp, and they are therefore subject to leg-ulcers that are difficult to cure. However, it is well to know that the ulcers of men engaged in fishing in rivers and marshes are very different from those that afflict sea-fishers; for fresh-water fishermen have foul ulcers that readily degenerate into gangrene, but sea-fishers have dry rough ulcers, as is remarked by Hippocrates, *On the use of liquids*, 7; and he prescribes fomentation with sea-water as the treatment for this kind of ulcer. Marziano has an excellent note on the passage. Though it would seem to the highly irrational to foment dry rough ulcers with sea-water, which is so sharp and biting that it is an irritant and

increases any discharge, he says that Hippocrates was right to prescribe it, for the following reasons: The ulcers of sea-fishers are very hard and dry, and by inducing irritation you can provoke suppuration; now unless ulcers suppurate you cannot heal them, a fact which Galen also notes. But you must treat differently the ulcers of those who carry on their fishing in rivers and marshy places; for foul ulcers of this sort applications that are drying but not irritating will be best. As Hippocrates says: "A dry ulcer is nearly well, but a wet ulcer is far from well." Sea-fishers suffer very much from constriction of the bowels, in spite of the fact that they eat much more than those who live ashore. Helmont remarks on this and says it is because the air they breathe is saturated with saline vapors; this whets the appetite and at the same time makes the bowels hard; also they eat more on account of the movement of the waves which constantly renews the air; this gives a stimulus to the fermentation of the blood. Now clusters of sea-water, though they are very effective for moving the bowels, actually induce dryness later. There is a noteworthy passage in Hippocrates. "People are mistaken about saline waters, from lack of experience, in that they think they relax the bowels and promote stools, whereas they in fact seriously hinder evacuation of the bowels and stools." Then let those who prescribe for constriction of the bowels sharp clusters with a great deal of salt learn from this how far they are astray from the path trodden by our inspired teacher. Therefore, for constriction of the bowels in fishermen it is more suitable to give softening and oily clusters; they should swallow mild lenitives and cathartics.

It is a known fact that fishermen are sometimes attacked with torpor and numbness of the arms and feet when, among the fish in the nets, there happens to be a cramp-fish, for the sea, like the land, has its venomous creatures, as Pliny records. This happens, not only by direct contact but also from a venomous aura, which is transmitted to the man's arm by the fishing-line or this spear; this is the explanation given by Dioscorides, Pliny, Mattioli, and others but from numerous experiments made by Stefano Lorenzini it is now certain that the fish can do this by bodily contact only, and that not every part of it has this faculty but only certain sickle-shaped muscles. The stupefying powers of the cramp-fish and the remedies to be used are fully described by Sennert.

## **DISEASES OF WORKERS WITH WOOD**

*Next* to corn and fruit the most useful thing that Nature has produced for man is trees and woods, indeed, as Pliny justly says: "At first, man's food came from trees, he made his cave softer with leaves and dressed in bark." Later, the saw was invented, and men began to cut trees into boards and so to make houses and a thousand other things for the use of mankind. We may conclude that Lyon in France was formerly built entirely of Wood, for Seneca tells us that that city was burnt down in a single night; so that the peasants who as usual came there in the early morning had not heard of this calamity, and when they came near and saw no city there they were thunderstruck and marvelled what had become of Lyon. Hence Seneca, where he deplores the misfortunes of mankind, exclaims: "For centuries a wood, and in a moment, ashes." Even today in regions far north there are cities built entirely of wood, Moscow, for instance, where there are huge warehouses in which stand for sale houses ready-made of whatever kind is

needed, large, small, and medium-sized to suit the buyer's fancy, so that in a few days one can have a house all finished on a chosen site.

The carpenter's trade, though we class such men under one head, is subdivided into several separate callings; some make only coaches and carriages, others casks and vats, others only ships. Some only carve with the chisel ornamental frames for mirrors and pictures; these are to be gilded later. Generally speaking, carpentering is a toilsome business and greatly fatigues the workers, but those who suffer most are the men who with a saw cut up trees into boards. This kind of work is very tiring; they place the squared tree-trunks so that they rest on two logs, and one workman stands on the trunk, the other under it while with a large saw they cut up the trunk, guided by lines painted on it in red. Hippocrates in *Regimen I*, describes admirably their method of working: "As when sawyers cut up timber with a saw; one pulls the other pushes, though both are of course doing the same thing; the man who presses downwards pulls at the man above him, otherwise the saw could not move downwards; but if they use too much force they will make a mess of the whole job." The man who is above the trunk has to work harder than the man underneath for he has to pull a rather heavy saw upwards, but the man working underneath suffers severely from the sawdust that keeps falling into his eyes and his mouth too; this makes his eyes red and painful afterwards, for he has to keep blinking them nearly all the time.

Those too who work at the lathe, especially when the wood is box, olive, or turpentine tree or the like, find their task very fatiguing; for they are obliged to put an incessant strain on the hands and arms in order to control the chisel and with it by degrees shave off the right amount according to the design of the work; the right foot is always at work to keep the wood that is to be shaped turning round and round; moreover they must keep the eyes fixed on the work, and from that rotary motion of the wood the eyes contract some injury from the material that they handle, except sometimes from cypress wood, for there are persons who cannot endure its pungent smell, and it gives them headache.

For carpenters I have no precautions to suggest except this: They should be moderate and not overwork, lest they bring diseases on themselves by being too much set on making money, and so by refusing to give in be forced later on to take a holiday from their business for many days. Gentle rubbing with oil will be beneficial, as it is for all workers who are exhausted by overwork. They must also consider their eyes, and to lessen their suffering as much as may be they should now and again stop working; and if these are subject to pain and redness they should be bathed with mild lotions, e.g. barley-water, violet-water, or woman's milk. But if from some other cause they are attacked by acute diseases, the doctor should be as cautious about administering strong remedies as in the case of other workers whose strength has been seriously exhausted by excessive toil.□



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