THE CLOVER LECTURE

THE IMPACT OF MAN, MACHINES AND MECHANISMS ON THE CLINICAL PRACTICE OF ANAESTHESIA

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MR. PRESIDENT, MR. DEAN, LADIES AND GENTLEMEN:

THIS OCCASION IS ONE THAT GIVES ME A PROFOUND SENSE OF GRATITUDE AND PLEASURE. I AM AWARE OF THE GREAT PRIVILEGE OF PRESENTING THE CLOVER LECTURE, THE MOST NOTED OF ALL LECTURES IN ANAESTHESIA. THE HIGH HONOR YOU HAVE GIVEN ME IS EMPHASIZED IN MY MIND BY THE REALIZATION THAT I AM THE FIRST FOREIGNER TO BE INVITED HERE FOR THIS PURPOSE. I SHOULD LIKE TO INTERPRET THE INVITATION TO ME TO APPEAR BEFORE YOU AS A SYMBOL OF THE CLOSE FEELING OF PROFESSIONAL AND PERSONAL FRATERNITY BETWEEN THE ANAESTHETISTS OF OUR TWO COUNTRIES. IT IS REALLY A REFLECTION OF OUR COMMON INTERESTS IN THE SAME GOAL OF PROVIDING BETTER AND SAFER ANAESTHESIA TO OUR PATIENTS. I DO NOT FOR A MOMENT, HOWEVER, SUGGEST THAT I HAVE THE RIGHT TO BE THE REPRESENTATIVE OF AMERICAN ANAESTHESIA TO THIS DISTINGUISHED AUDIENCE. THE ERRORS AND SHORTCOMINGS OF THIS LECTURE MUST BE ATTRIBUTED SOLELY TO ME AND NOT TO MY COMPATRIOTS.

MR. A. D. MARSTON, YOUR FIRST DEAN, IN THE FIRST CLOVER LECTURE GIVEN ON THE 16TH OF MARCH 1949 STATED IN CONCLUDING HIS ADDRESS, "I AM SURE THAT ALL THE FELLOWS AND MEMBERS OF OUR FACULTY IN THIS COLLEGE WILL AGREE WITH ME WHEN I BEG TO EXPRESS THE HOPE THAT THE

INAUGURATION OF THIS ANNUAL MEMORIAL LECTURE WILL IN SOME MEASURE KEEP EVER GREEN THE MEMORY OF JOSEPH THOMAS CLOVER." MARSTON (1949) IT IS MY PROFOUND WISH THAT MY EFFORTS TODAY WILL ALSO AID IN THIS WORTHY PURPOSE.

THOSE OF YOU WHO READ OR LISTEN TO ANNUAL LECTURES WILL UNDOUBTEDLY HAVE NOTICED THAT THEY ARE GENERALLY DIVIDED INTO THREE LARGE GROUPS: THOSE WHICH PAY HOMAGE TO OUR MEDICAL ANCESTORS FROM ARISTOTLE TO ZINNSER: THOSE WHICH INTRODUCE A NEW SCIENTIFIC CONCEPT OR REVIEW THE PARTICULAR INVESTIGATIVE OR CLINICAL EXPERIENCES OF THE SPEAKER; AND, FINALLY, THOSE WHICH MAY BE CATEGORIZED AS LITERARY DISCOURSES ON PHILOSOPHICAL SUBJECTS. I DON'T KNOW HOW TO CLASSIFY THIS LECTURE. AT ITS CONCLUSION SOME OF YOU WILL DECIDE IT WAS A MIXED STEW; OTHERS WILL THINK IT IS NOT TRUE; SOME WILL REALIZE THEY KNEW IT ALL THE TIME, AND MANY WILL FEEL IT IS UNIMPORTANT!

DESPITE THESE HAZARDS, I SHALL TAKE THE RISK. THIS LECTURE WILL HAVE NO NEW SCIENTIFIC GEMS; IT WILL BE A MOST INCOMPLETE HISTORY; AND IT WILL NOT RANK WITH THE CLASSIC PROSE OF THIS OR ANY OTHER ERA!

THIS IS NOT THE OCCASION TO REVIEW ONCE AGAIN THE LIFE AND TIMES OF DR. CLOVER, PERHAPS OUR MOST DISTINGUISHED PROFESSIONAL ANCESTOR IN ANAESTHESIA, BUT IT DOES PROVIDE THE OPPORTUNITY TO REFRESH YOUR MEMORY BRIEFLY ABOUT SOME OF HIS ACCOMPLISHMENTS WHICH LED TO THE DEVELOPMENT OF MODERN ANAESTHESIA AND MADE HIM IMMORTAL. POSSIBLY HIS INTEREST IN ANAESTHESIA BEGAN WHEN HE WAS A STUDENT AT UNIVERSITY COLLEGE HOSPITAL. IT IS PROBABLE, BUT NOT CERTAIN, THAT HE WITNESSED THE FIRST EUROPEAN ADMINISTRATION OF ETHER ON 21 DECEMBER, 1846 AND WAS IMPRESSED WITH THE NEED TO DEVELOP THIS NEW BRANCH OF MEDICINE WITH SO MUCH VALUE FOR SERVICE TO HUMANITY. CLOVER IS WIDELY CREDITED WITH THE DEVELOPMENT OF ANAESTHETIC APPARATUS, THE ESTABLISHMENT OF THE NITROUS OXIDE-ETHER SEQUENCE, AND THE POPULARIZATION OF ETHER INSTEAD OF CHLOROFORM IN EUROPE. HE WAS

ALSO AN EXTRAORDINARILY SKILLFUL CLINICAL PRACTITIONER OF ANAESTHESIA. HIS ANTICIPATION OF THE VALUE OF SCIENTIFIC KNOWLEDGE TO CLINICAL PRACTICE IS IN STRIKING EVIDENCE IN HIS OWN ARTICLE ON "ANAESTHETICS" PUBLISHED IN QUAIN'S DICTIONARY OF MEDICINE IN 1883. THIS ARTICLE WAS BROUGHT TO MY ATTENTION THROUGH THE KINDNESS OF DR. JOHN F. NUNN. IT APPEARED ONE YEAR AFTER CLOVER'S DEATH. HE WROTE ABOUT THE VALUE OF PRECISE OBSERVATION OF PATIENTS DURING ANAESTHESIA WHEN HE STATED THAT "THE PULSE AS WELL AS THE RESPIRATION MUST BE WATCHED". THE "WATCHING" MUST HAVE REFERRED TO A CLOSE AND INTIMATE CARE OF PATIENTS DURING ANAESTHESIA. CLOVER ANTICIPATED ALSO THE PRESENT SCIENTIFIC INTEREST IN THE UPTAKE AND DISTRIBUTION OF ANAESTHETIC AGENTS IN THE BODY BY STATING THAT "CARE MUST ALWAYS BE TAKEN THAT THE SUPPLY OF GAS IS SUFFICIENT TO REPLACE ANY THAT IS LOST BY ABSORPTION INTO THE BLOOD OR BY LEAKAGE." QUAIN (1883) A FINAL QUOTATION FROM THIS ARTICLE OF CLOVER'S APTLY SUMMARIZES THE INFLUENCE HE HAD IN DEVELOPING EXPERT CLINICAL CARE IN ANAESTHESIA. HE SAID, "WE MAY SAY GENERALLY THAT ANY PERSON FIT FOR A SEVERE OPERATION IS A FIT SUBJECT FOR AN ANAESTHETIC BUT NO ONE IS SO FREE FROM DANGER THAT CARE AND WATCHING ITS EFFECTS CAN BE DISPENSED WITH." QUAIN (1883) CLOVER MUST HAVE BELIEVED IN BOTH SCIENCE AND IN CLINICAL SKILL. HE SHOWED, AS MODERN ANAESTHESIA BEGAN, THAT THEY COULD LIVE IN HARMONY.

OUR NEED FOR SCIENCE AND EDUCATION STARTED IN ANAESTHESIA BY CLOVER WAS BLUNTLY AND BEAUTIFULLY SUMMARIZED BY ALFRED NORTH WHITEHEAD IN 1916 IN A DISCUSSION OF THE VALUE OF THE PRACTICAL USE OF INTELLIGENCE. HIS THOUGHTS ARE EASILY APPLIED TO ANAESTHESIA. "IN THE CONDITIONS OF MODERN LIFE, THE RULE IS ABSOLUTE: THE RACE WHICH DOES NOT VALUE TRAINED INTELLIGENCE IS DOOMED. NOT ALL YOUR HEROISM, NOT ALL YOUR SOCIAL CHARM, NOT ALL YOUR WIT CAN MOVE BACK THE FINGER OF FATE. TODAY WE MAINTAIN OURSELVES. TOMORROW SCIENCE WILL HAVE MOVED FORWARD YET ONE MORE STEP, AND THERE WILL BE NO

APPEAL FROM THE JUDGMENT WHICH WILL BE PRONOUNCED ON THE UNEDUCATED."

HOWEVER, THERE ARE OTHER FACTORS OFTEN UNSPOKEN, USUALLY UNWRITTEN, WHICH ALSO HAVE AN IMPORTANT AND COMPELLING INFLUENCE UPON THE PRACTICE OF CLINICAL ANAESTHESIA DO NOT, OF NECESSITY, DERIVE DIRECTLY AND ABSOLUTELY, FROM CLINICAL EXPERIENCE OR FROM SCIENTIFIC RESEARCH. I SHALL REVIEW A FEW OF THESE PARAANAESTHETIC CONSIDERATIONS TO SHOW THE NATURE OF THEIR IMPACT ON THE PRACTICE OF CLINICAL ANAESTHESIA AND ON RESEARCH IN ANAESTHESIA.

THE INFLUENCE OF THE CONSTRUCTION OF APPARATUS FOR ADMINISTERING ANAESTHETICS IS A CASE IN POINT. WE SEEM TO BE MOST COMFORTABLE IN USING THE APPARATUS OF OUR YOUTH — AND THE QUANDARIES OF ENCOUNTERING NEW APPARATUS MAY CAUSE AN EXPERT TO QUAKE IN BEFUDDLEMENT. WITNESS THE AMERICAN WHO FIRST SEES A BRITISH BOYLE'S MACHINE (SLIDE 1)— OR THE BRITON WHO IS ASKED TO DEMONSTRATE HIS FAVORITE TECHNIQUE ON AN AMERICAN OHIO CHEMICAL MACHINE! (SLIDE 2)

NEXT, WE MIGHT CONSIDER SOME OF THE WAYS IN WHICH ENVIRON-MENTAL FACTORS INFLUENCE THE PRACTICE OF ANAESTHESIA. LET US CONSIDER, THE SIMPLE FACT THAT AMBIENT TEMPERATURE VARIES IN DIFFERENT COUNTRIES AND WITH THE SEASONS. IT WAS BELIEVED FOR MANY YEARS BEFORE THE USE OF AIR CONDITIONING THAT ANAESTHESIA IN THE TROPICS COULD NOT INCLUDE INHALATION AGENTS BECAUSE ONLY OPEN METHODS OF ADMINISTRATION WERE AVAILABLE. IT IS DIFFICULT TO CONDUCT ANAESTHESIA SMOOTHLY AND SAFELY USING THIS METHOD BECAUSE OF THE HIGH AMBIENT TEMPERATURES AND THE HIGH RELATIVE HUMIDITY. UNDER THESE CIRCUMSTANCES THE DEVELOPMENT OF REGIONAL ANAESTHESIA WAS ADVOCATED AS THE METHOD OF CHOICE. ONE SOLUTION OF THE PROBLEM OF HIGHER TEMPERATURES APPEARED AS THE CONSEQUENCE OF THE DESIGN OF NEW AND EFFECTIVE VAPORIZERS. GENERAL ANAESTHESIA CAN NOW BE USED IN MANY HOT CLIMES BECAUSE OF THIS CHANGE IN EQUIPMENT. OF COURSE, NEW VAPORIZERS WERE ACTUALLY PLANNED FOR A COMPLETELY DIFFERENT PURPOSE. SEVERAL VAPORIZERS ARE CURRENTLY AVAILABLE WHICH COMPENSATE FOR

CHANGES IN AMBIENT TEMPERATURE AND WITHIN REASONABLE LIMITS MAINTAIN VAPOR CONCENTRATION IN THE EFFLUENT MIXTURE AT A CONSTANT LEVEL. THOSE VAPORIZERS THAT DEPEND ON THE TRANSMISSION OF HEAT AND DO NOT COMPENSATE FOR TEMPERATURE CHANGES ALSO FUNCTION ADEQUATELY IF THE VAPOR PRESSURE AND THE TEMPERATURE OF THE LIQUID ARE KNOWN. IN THIS MANNER, A WHOLE METHOD OF APPROACH TO ANAESTHETIC PRACTICES IN CERTAIN PARTS OF THE WORLD IN THE FUTURE MAY BE CONDITIONED NOT BY THE TOTALITY OF CLINICAL AND SCIENTIFIC FACTS BUT MORE BY THE LIMITATIONS OR LACK OF LIMITATIONS OF PURELY TECHINCAL METHODS OF ADMINISTERING ANAESTHETIC AGENTS. FOR INSTANCE, WHO CAN TELL WHETHER THE NATURE OF CLINICAL ANAESTHESIA IN THE NEW AFRICAN NATIONS WILL BE DETERMINED MORE BY VAPORIZER DESIGN AND THE AVAILABILITY OF COMPRESSED GASES THAN BY CLINICAL OR SCIENTIFIC ADVANCES IN THE WESTERN NATIONS?

OF COURSE, THERE ARE OTHER MEANS OF TRANSFERRING HEAT TO ANAESTHETIC LIQUIDS — AND THEY DO NOT NECESSARILY OCCUR IN THE NEW NATIONS. A POSSIBLE METHOD, NEVER CONSIDERED SERIOUSLY AS YET, IS SHOWN IN HAWAII, THE 50TH AMERICAN STATE (SLIDE 3).

AIR CONDITIONING IN OPERATING THEATRES HAS BECOME ALMOST UNIVERSAL IN THE UNITED STATES TO PROVIDE AN EVEN ENVIRONMENT IN CLIMATES THAT ARE OFTEN SEVERE IN WINTER AND ALSO IN SUMMER. FOR REASONS ASSOCIATED WITH BACTERIOLOGIC CONTROL IN YOUR COUNTRY, SOME OF THE PLANS FOR AIR CONDITIONING ARE GOING TO PROVE A SOCIOLOGICAL AND CLINICAL DELIGHT. THE DEBATE AS TO WHETHER TROUSERS OR SKIRTS ARE BETTER (BACTERIOLOGICALLY SPEAKING, THAT IS!) MAY HAVE SOME INTERESTING AND FASCINATING COLLATERAL EFFECTS IN THE VERY NEAR FUTURE IN GREAT BRITAIN.

THE MAN-MADE CHANGE IN ENVIRONMENT HAS HAD A MARKED INFLUENCE UPON THE CONDUCT OF ANAESTHESIA IN THAT IT IS NOW POSSIBLE TO ARRANGE ANAESTHETIC PRACTICES WHICH CAN IGNORE VARIATIONS IN HUMIDITY (THIS HAS A BEARING ON THE EXPLOSION PROBLEM) AND VARIATIONS IN

TEMPERATURE. THE CLINICAL PROBLEM OF CONVULSIONS DUE TO HEAT LOADING IN THE HOSPITALS OF THE UNITED STATES HAS BEEN ELIMINATED SIMPLY BY THIS CHANGE IN ENVIRONMENT. TO BE SURE, A NEW SET OF PROBLEMS HAS ARISEN, PARTICULARLY FOR THE NEWBORN AND YOUNG INFANTS. THEIR TEMPERATURE CONTROL IS LESS EFFECTIVE THAN IN OLDER CHILDREN OR IN ADULTS AND ONE FINDS A GREATER TENDENCY FOR FALLS IN BODY TEMPERATURE IN AIR CONDITIONED ENVIRONMENTS. THE HYPOTHERMIA IN THESE YOUNG PATIENTS HAS A TENDENCY TO SLOW DRUG METABOLISM, AND ALSO TO FACILITATE THE PENETRATION OF THE BLOOD BRAIN BARRIER BY SOME DRUGS, E.G., CURARE. HYPOTHERMIA DUE TO AIR CONDITIONING FOR BOTH REASONS MAY ENHANCE THE NET EFFECTS OF CERTAIN DRUGS.

CHANGES IN THE ATMOSPHERIC PRESSURE ALSO CAN HAVE AN IMPACT UPON CERTAIN ASPECTS OF ANAESTHETIC PRACTICE. AT HIGH ALTITUDES, EVEN AT MODEST ALTITUDES OF 7,000 FEET WHERE SYMPTOMS ORDINARILY WOULD NOT OCCUR IN HEALTHY PATIENTS, THE ATMOSPHERIC PRESSURE IS APPROXIMATELY 580 MM HG. FOR PERMANENT RESIDENTS IN THESE AREAS, THERE WILL BE A TENDENCY FOR AN INCREASE OF HEMOGLOBIN CONCENTRATION TO COMPENSATE IN PART, AT LEAST, FOR THE LOWERED PARTIAL PRESSURE OF OXYGEN. UNDER THESE CONDITIONS NON-POTENT ANAESTHETIC AGENTS LIKE NITROUS OXIDE AND ETHYLENE ARE LESS VALUABLE THAN AT SEA LEVEL.

THE OTHER FACE OF THIS PROBLEM, THE DEVELOPMENT OF HIGH PRESSURE ENVIRONMENTS, IS ALREADY BECOMING INTERESTING FOR THE ANAESTHETIST IN THAT HE NOW MUST ANAESTHETIZE PATIENTS EXPOSED TO UPWARDS OF 3 ATMOSPHERES OF OXYGEN. THE INVESTIGATIONS IN THIS AREA ARE NOT NUMEROUS AND ONLY PARTIAL ANSWERS TO THE IMPLICATIONS OF ANAESTHETIC PROBLEMS ARE AVAILABLE AS YET.

THE GENERAL ECONOMIC STATUS OF A COMMUNITY AND ITS POLITICAL AND SOCIAL ORGANIZATION HAS A MUCH GREATER EFFECT UPON THE PRACTICE OF MEDICINE, INCLUDING THE PRACTICE OF ANAESTHESIA, THAN IS USUALLY APPRECIATED. IN COUNTRIES WHERE INDUSTRY AND TECHNOLOGICAL DEVELOPMENT ARE WELL ADVANCED, EQUIPMENT AND MEDICINES ARE FREELY

AVAILABLE. IN UNDERDEVELOPED COUNTRIES ANAESTHETIC EQUIPMENT, AS WELL AS OTHER MEDICAL INSTRUMENTS AND DRUGS, MUST BE IMPORTED. THE RESULT IS, INEVITABLY, SCARCITY OF IMPORTANT ITEMS AND A MARKED RISE IN COST TO THOSE LEAST ABLE TO PAY. THE SUPPLY OF ITEMS ESSENTIAL FOR ANAESTHETIC PRACTICE HAS ALWAYS BEEN TAKEN FOR GRANTED IN ADVANCED TECHNOLOGICAL COUNTRIES LIKE THE UNITED KINGDOM AND THE UNITED STATES.

FOR INSTANCE, THE MARKED ADVANCES IN INSTRUMENTATION IN THE UNITED STATES HAVE LED TO OCCASIONAL ODD MANIFESTATIONS. THERE CAN BE TOO MUCH OF A GOOD THING! (SLIDE 4)

IT IS DIFFICULT FOR A FOREIGNER TO KNOW THE SITUATION IN THE UNITED KINGDOM WITH ACCURACY. IT MAY EVEN BE A MATTER OF SOME DELICACY TO MENTION THE ROLE OF TECHNOLOGICAL ADVANCES IN VIEW OF THE VEXING ISSUE OF THE "BRAIN DRAIN". WHATEVER THE FACTS MAY BE, AND WHATEVER YOUR BELIEFS MAY BE, MANY OF US IN THE UNITED STATES WOULD BE HAPPY TO REPATRIATE PROFESSOR BUSH AND OTHER BRITISH SCIENTISTS ONCE AGAIN FOR A PROMISE THAT THE GENTLEMEN IN THE NEXT SLIDE (SLIDE 5) WILL NOT BE EXPORTED ONCE AGAIN TO OUR COUNTRY IN THE NEAR FUTURE. THE DISRUPTION OF NORMAL LIFE WAS TOO SEVERE DURING OUR LAST EXPERIENCE.

PERHAPS THE PROBLEM COULD BEST BE SOLVED IN BOTH OUR COUNTRIES IF WE HAD MORE CERTAINTY IN THE MANAGEMENT OF GOVERNMENTAL AFFAIRS -- AS OTHERS SEEM TO HAVE. (SLIDE 6)

THE LACK OF MEDICAL SUPPLIES IN MANY AREAS OF THE WORLD IS A PROBLEM OF SIGNIFICANCE. BECAUSE OF ECONOMIC FACTORS, REGIONAL ANAESTHESIA MAY BECOME INCREASINGLY POPULAR. A NEEDLE, SYRINGE, AND A LOCAL ANAESTHETIC DRUG ARE OFTEN MORE AVAILABLE AND LESS EXPENSIVE THAN OTHER METHODS OF GIVING ANAESTHETICS. ALSO INTRAVENOUS GENERAL ANAESTHESIA CAN BE PRODUCED WITH BARBITURATES, ANALGESICS, MUSCLE RELAXANTS AND ALSO INTRAVENOUSLY INJECTED LOCAL ANAESTHETICS E.G. IN LATIN AMERICAN WITHOUT THE USE OF COMPRESSED GASES BECAUSE OF THE

EXPENSE AND DIFFICULTIES OF OBTAINING GAS CYLINDERS. CLEARLY, THE STAGE OF TECHNOLOGICAL AND ECONOMIC DEVELOPMENT OF A NATION INFLUENCES ITS METHODS OF GIVING ANAESTHETICS, APART FROM CLINICAL KNOWLEDGE AND SCIENTIFIC FACT.

THE NATURE OF THE POLITICAL ORGANIZATION OF A COUNTRY MAY INFLUENCE THE SUPPLY OF ALL MEDICAL PERSONNEL AND THE AVAILABILITY OF ANAESTHETISTS IN PARTICULAR. IN COUNTRIES LIKE THE UNITED STATES WHICH ARE SO HEAVILY ORIENTED TOWARD THE PRIVATE PRACTICE OF MEDICINE (I.E., 85% OF ALL ANAESTHESIOLOGISTS IN THE UNITED STATES ARE IN PRIVATE PRACTICE) THE ELEMENTS THAT ATTRACT INDIVIDUALS INTO ANAESTHETICS MAY HAVE ONLY AN INCIDENTAL RELATIONSHIP TO THE MEDICAL NEEDS OF A COUNTRY AND MAY BE GOVERNED LARGELY BY ECONOMIC OR OTHER OPPORTUNITIES. IN THOSE COUNTRIES WHERE MEDICINE IS MORE CENTRALLY ORGANIZED AND WHERE THE ANAESTHETIST ENJOYS A STATUS PROFESSIONAL AND FINANCIAL EQUALITY WITH OTHER SPECIALISTS, PHYSICIANS MAY BE ATTRACTED INTO THE SPECIALTY FOR ALTOGETHER DIFFERENT REASONS. THE KIND OF PHYSICIAN WHO ENTERS OUR SPECIALTY, AS WELL AS HIS INTERESTS, OFTEN HAS A MARKED INFLUENCE ON THE KIND OF ANAESTHETIC METHODS HE WILL CHOOSE FOR THE CLINICAL CARE OF PATIENTS. THE ENTIRE QUESTION OF NURSE ANAESTHESIA IN THE UNITED STATES AND IN MANY OTHER PARTS OF THE WORLD IS CONDITIONED TO A VERY LARGE DEGREE BY THIS KIND OF ISSUE AND IS NOT BY ANY MEANS A MATTER OF CHOICE OR OF TRADITION. IT IS NOT A SIMPLE MATTER TO DISCUSS THE ISSUE OF NURSE ANAESTHETISTS IN DETAIL. THE MAIN POINT FOR THIS DISCUSSION IS THAT THE KIND OF AVAILABLE PERSONNEL WILL INFLUENCE THE KIND OF ANAESTHETICS THAT ARE ADMINISTERED. NURSES WHO GIVE ANAESTHETICS ARE RESTRICTED, QUITE PROPERLY, IN THE AGENTS AND METHODS THAT ARE PERMITTED. THE INFLUENCE THIS FACT HAS ON THE WAY IN WHICH ANAESTHESIA IS PRACTICED MUST BE ENORMOUS, AND AGAIN HAS LITTLE TO DO WITH RATIONAL AND SCIENTIFIC CONSIDERATIONS. IT IS A DEVELOPMENT THAT PROCEEDS FROM OTHER LARGE NON-MEDICAL FORCES.

IN CONSIDERING FURTHER THE MATTER OF SOCIAL AND ECONOMIC FORCES, THE ACTUAL STANDARD OF LIVING OF A PEOPLE BECOMES A FACTOR OF SOME IMPORTANCE IN ITS INFLUENCE ON ANAESTHETIC PRACTICE. IN AFFLUENT SOCIETIES, PATIENTS TEND TO BE MORE ACCUSTOMED TO PHYSICAL COMFORT AND MORE DEMANDING OF EMOTIONAL AND MENTAL COMFORT. THE CONSIDERATION OF PATIENT COMFORT MAY BECOME AN OVERRIDING FACTOR IN THE CHOICE OF ANAESTHESIA AND MAY, IN FACT, BE IN CONFLICT WITH PROPER ELEMENTS OF SAFETY IN SOME INSTANCES. THIS PROBLEM BECOMES EVEN MORE IMPORTANT AS IT BECOMES INVOLVED WITH PRIVATE PRACTICE INFLUENCES OR IN SOCIETIES VW ERE LEGAL ACTION IS QUICKLY TAKEN FOR FANCIED OR ACTUAL INJURIES CAUSED BY DOCTORS DURING THE TREATMENT OF PATIENTS, INCLUDING THE ADMINISTRATION OF ANAESTHETICS. IN THE UNITED STATES, FOR INSTANCE, HEALTHY PATIENTS ACCUSTOMED TO MANY OF THE COMFORTS OF LIVING OFTEN BECOME QUITE DEMANDING OF SERVICE FROM ALL MEMBERS OF THE MEDICAL PROFESSION, INCLUDING THE ANAESTHETIST. IN THIS PARTICULAR RELATIONSHIP MAY LIE THE BASIS FOR CERTAIN HABITS, EVEN NICETIES, IN THE PRACTICE OF ANAESTHESIA AND FOR THE USE OF PARTICULAR DRUGS AND ANAESTHETIC METHODS. ONE WOULD BE HARD PUT OTHERWISE TO EXPLAIN THE SUBSTANTIAL EFFORTS TO CONTROL CLINICAL SYMPTOMS, OFTEN TRIVIAL, BY THE ROUTINE USE OF TRANQUILIZERS FOR PREANAESTHETIC MEDICATION AND ANTI-EMETICS FOR POSTOPERATIVE CARE. THE USE OF THOSE ANAESTHETIC AGENTS AND METHODS WHICH PROVIDE THE MOST COMPLETE OBLITERATION OF THE STATE OF CONSCIOUSNESS AND AWARE-NESS OF THE ENTIRE SURGICAL EXPERIENCE IS OFTEN OVERDONE. IN SHORT, LARGE DOSES OF PREANAESTHETIC DRUGS, LARGE DOSES OF INDUCING AGENTS AND HEAVY SEDATION IN THE POSTOPERATIVE PERIOD ARE EMPLOYED MORE FREQUENTLY THAN WOULD BE DESIRABLE ON RATIONAL MEDICAL GROUNDS. IT IS HIGHLY LIKELY THAT THESE DISTORTIONS OF ANAESTHETIC PRACTICE HAVE A SERIOUS IMPACT ON THE COMPLICATIONS WHICH PATIENTS MUST INEVITABLY SUFFER. ALTHOUGH I AM NOT WELL INFORMED ON THE QUESTION, IT IS CONCEIVABLE THAT IN A SOCIETY IN WHICH MEDICAL CARE IS GOVERNMENT OR

COMMUNITY CONTROLLED, E.G., IN BRITAIN SIMILAR PROBLEMS MAY ARISE FOR DIFFERENT REASONS. THE PATIENT AS A CONSUMER MAY FEEL THAT HE HAS "CERTAIN ANAESTHETIC RIGHTS" SINCE HE "OWNS" HIS MEDICAL CARE IN COMMON WITH OTHER MEMBERS OF THE COMMUNITY.

ALTHOUGH THESE ELEMENTS ARE DIFFICULT TO MEASURE WITH PRECISION, A FORM OF NATIONAL OR GOVERNMENT SERVICE HAS THE POSSIBILITY OF PROVIDING A MORE EVEN LEVEL OF EXCELLENCE IN ANESTHETIC CARE AND ADEQUATE SUPPLIES OF ANAESTHETIC EQUIPMENT AND DRUGS. HOWEVER, RETARDATION OF ANAESTHETIC DEVELOPMENT COULD OCCUR IN SOCIETIES WHOSE CENTRAL CONTROL IS SUBSTANTIAL OR COMPLETE AND WHERE THERE IS A LACK OF APPRECIATION OF THE VALUE OF MODERN ANAESTHESIA; OR WHERE SO MUCH NEEDS TO BE DONE THAT ANAESTHESIA IS PLACED LOW IN A PRIORITY LIST WHICH HAS PUBLIC HEALTH AND NUTRITION AT THE TOP, E.G. SOME OF THE COMMUNIST COUNTRIES.

IN THE SOCIETIES WHERE PRIVATE PRACTICE IS THE PREDOMINANT FORM, THE LEVEL AND TYPE OF ANAESTHETIC CARE CAN AND DOES VARY WIDELY. THIS IS WHY A VISITOR TO THE UNITED STATES IS SOMETIMES PUZZLED BY THE ASTONISHING VARIATION THAT HE IS APT TO SEE IN ATTITUDES TOWARD ANAESTHESIA, METHODS OF PRACTICE, AND GENERAL STANDARDS OF EXCELLENCE. IN THE LARGER MEDICAL CENTERS CONTROLLED OR AFFILIATED WITH UNIVERSITIES, THE ATTENTION TO PATIENT CARE IS OFTEN BUT NOT ALWAYS INFLUENCED BY AN ENVIRONMENT OF SCHOLARLY ACHIEVEMENT IN EDUCATION AND RESEARCH. WHEN PROPERLY ORGANIZED, SCIENCE AND TEACHING HELP RAISE THE LEVEL OF CLINICAL ANAESTHESIA. WHEN POORLY CONDUCTED AND ORGANIZED THEY MAY, IN FACT, LOWER THE STANDARD OF CLINICAL EXCELLENCE. IT DEPENDS ON THE INTEREST THE ANAESTHETISTS HAVE IN SICK PEOPLE AND THE CARE OF PATIENTS. THE UNIVERSITY PRACTICE OF ANAESTHESIA IS INEVITABLY DIFFERENT FROM THAT IN THE COMMUNITY HOSPITALS IN OUR COUNTRY. IN THE TEACHING CENTER, THERE IS OFTEN AN EMPHASIS UPON VERSATILITY AND VARIATION IN ANAESTHETIC TECHNIQUES. THE PURPOSES ARE THE MAINTENANCE OF PROGRESS OF

CONCEPTUAL AND TECHNICAL ADVANCES. IN THOSE TEACHING ENVIRONMENTS WHERE THE EDUCATORS ARE LESS CONVINCED OF THE IMPORTANCE OF VERSATILITY, THERE IS APT TO BE RELATIVELY LESS VARIATION IN ANAESTHETIC METHODS BECAUSE THE PREVAILING MODE OF PRACTICE IS GOVERNED BY WHAT THE EDUCATORS DEEM TO BE BEST AND MOST EFFICIENT. IN COMMUNITY HOSPITALS IN THE UNITED STATES, MOST OF WHICH ARE GEARED TO PRIVATE PRACTICE, ANAESTHESIA TENDS TO BE MUCH LESS VARIED AND THE ANAESTHETIST MAY USE ONE METHOD WHICH HE HAS FOUND EFFECTIVE AND EFFICIENT FOR HIM. THE LEVEL OF SKILL WITH WHICH HE WORKS IS DEPENDENT UPON WHAT HE BRINGS TO A PARTICULAR TECHNIQUE OR SMALL NUMBER OF TECHNIQUES. IN MANY INSTANCES THE CHOICES OF ANAESTHESIA ARE VERY SENSIBLE AND THE QUALITY OF THE ANAESTHESIA VERY HIGH. IN OTHERS, ANAESTHESIA MAY NOT BE AS SUITABLE TO THE MEDICAL AND SURGICAL PROBLEMS. ODDLY ENOUGH, THE FAVORITE METHODS DIFFER CONSIDERABLY FROM REGION TO REGION AND ANAESTHETIST TO ANAESTHETIST.

THERE IS, OF NECESSITY, A DIFFERENT ATTITUDE TOWARD THE ADMINISTRATION OF ANAESTHESIA IN THE ARMED FORCES OF THE UNITED STATES. IN PEACETIME, IN LARGE MILITARY HOSPITALS, THE MODES OF PRACTICE RESEMBLE CIVILIAN PRACTICE IN THE TEACHING HOSPITALS. HOWEVER, IN COMBAT OR UNDER CONDITIONS OF MASS CASUALTIES THE ATTITUDE TOWARD ANAESTHESIA TAKES QUITE A DIFFERENT FORM. IN PAST YEARS IN THE ARMED FORCES OF THE UNITED STATES, FOR REASONS NOT ALTOGETHER CLEAR AND OBVIOUSLY NOT RATIONAL, IT WAS ASSUMED THAT THERE WOULD NEVER BE ANAESTHETISIS ENOUGH TO DEAL WITH THE ANAESTHETIC PROBLEMS AT HAND BUT THAT THERE WOULD ALWAYS BE SURGEONS IN ADEQUATE QUANTITY TO DO THE OPERATIONS! IT SEEMED AS THOUGH AMERICAN ANAESTHETISTS WERE MORE VULNERABLE TO ENEMY ACTION THAN AMERICAN SURGEONS – OR SO IT APPEARED TO OUR MILITARY AUTHORITIES! THE NET RESULT WAS THE PROVISION OF EXCELLENT FACILITIES, EQUIPMENT AND CIRCUMSTANCES FOR SURGEONS. IN CONTRAST, ONLY THE MOST PRIMITIVE ANAESTHETIC EQUIPMENT AND DRUGS WERE PROVIDED TO ANAESTHETISTS. RECENTLY, THIS CONCEPT HAS CHANGED

CONSIDERABLY AND IT BECAME EVIDENT THAT ANAESTHETISTS WERE NEITHER MORE NOR LESS VULNERABLE TO MILITARY INJURY THAN SURGEONS! IN THE ARMED FORCES OF THE UNITED STATES THE BEST POSSIBLE ANAESTHETIC EQUIPMENT IS NOW PROVIDED FOR MEDICAL INSTALLATIONS IN ACCORDANCE WITH THEIR MILITARY REQUIREMENTS. IN FIELD OPEATIONS WHERE THE LOGISTICS OF SUPPLY MAY BECOME A SEVERE PROBLEM, EFFORTS HAVE BEEN MADE TO DEVELOP SIMPLE PORTABLE EQUIPMENT IN THE SAME MANNER THAT HAS TAKEN PLACE IN THE ARMED FORCES OF THE UNITED KINGDOM AND OTHER COUNTRIES. ANAESTHETIC APPARATUS WHICH EITHER USES NO COMPRESSED GASES OR SMALL AMOUNTS OF SUPPLEMENTARY OXYGEN IN THE MANNER SHOWN TO BE SO IMPORTANT BY NUNN (1961) HAVE BEEN STUDIED. SOME CONSIDERATION HAS ALSO BEEN GIVEN TO THE INSTRUCTION OF NON-MEDICAL PERSONNEL FOR THE ADMINISTRATION OF ANAESTHESIA WITH APPARATUS WHICH IS SAID TO BE "FOOLPROOF" BUT APPARENTLY IS NOT "HUMAN PROOF"!

THE ATTITUDE OF THE NON-MEDICAL PUBLIC OFTEN HAS AN INFLUENCE ON THE PRACTICE OF ANAESTHESIA, SOMETIMES IN A MANNER THAT IS NOT ALTOGETHER SUBTLE. SOME ILLUSTRATIONS OF THIS INFLUENCE IN CONNEC-TION WITH THE DISCUSSION OF OUR AFFLUENT SOCIETY HAVE ALREADY BEEN NOTED. ANOTHER EXAMPLE OF THE INFLUENCE OF THE LAY PUBLIC'S ATTITUDE TO ANAESTHESIA LIES IN THE SYSTEMATIC MYTHOLOGY CONCERNING ANAES-THETICS WHICH LAYMEN DEVELOP, COUPLED WITH THE TENDENCY TO SUE IF THESE MYTHS ARE IGNORED! THE USE OF SPINAL ANAESTHESIA IS AN EXAMPLE. THE FACT IS THAT PARALYSIS FROM SPINAL ANAESTHESIA DOES OCCUR BUT IT IS RARE. IN A WELL CONDUCTED STUDY BY VANDAM AND DRIPPS THE INCIDENCE OF PARALYSIS WAS CLEARLY LOW AND THE BENEFITS FROM SPINAL ANAESTHESIA GREAT. NONETHELESS, DESPITE THE SMALL INCIDENCE OF DAMAGE FROM SPINAL ANAESTHESIA, ANAESTHETISTS IN MANY PARTS OF THE UNITED STATES (AND I PRESUME IN OTHER PARTS OF THE WORLD) HAVE ABANDONED SPINAL ANAESTHESIA BECAUSE OF THE FEAR OF LAWSUIT. THEIR PRACTICE WAS NOT AFFECTED SO MUCH BY THE FEAR THAT THE METHOD WAS UNSATISFACTORY, BUT BY A PUBLICLY HELD MYTH. THIS NEGATIVE INFLUENCE

ON THE PRACTICE OF ANAESTHESIA IS ASTOUNDING. THE USE OF HALOTHANE IS ANOTHER ILLUSTRATION. AFTER PUBLICATION OF THE REPORTS BY BUNKER AND BLUMENFELD (1963) AND LINDENBAUM AND LEIFER (1963) OF TOXICITY ON THE LIVER CAUSED BY HALOTHANE, AN ARTICLE OF CONSIDERABLE INFLUENCE, SUGGESTING THAT HALOTHANE WAS A CAUSE OF LIVER DAMAGE, APPEARED IN THE WALL STREET JOURNAL. THIS PAPER IS WIDELY READ AND RESPECTED BY THE LAY PUBLIC IN THE UNITED STATES. THE IMPACT OF THIS ARTICLE WAS SUCH THAT MANY PATIENTS INQUIRED WHETHER THEY WERE TO RECEIVE HALOTHANE. OTHERS ACTUALLY REFUSED IT. THE ANAESTHETIST WHO BELIEVES THAT MYTHOLOGY AND LEGAL PROBLEMS DO NOT ALTER HIS PRACTICE SUFFERS ILLUSIONS. THIS ATTITUDE OF THE LAY PUBLIC ALSO MAY HAVE AN UNFAVORABLE INFLUENCE ON THE DEVELOPMENT OF NEW ANAESTHETIC PRACTICES AND METHODS. THE CLINICAL ANAESTHETIST IS OFTEN LOATH TO ATTEMPT TO USE NEW DRUGS OR NEW ANAESTHETICS UNLESS THEY ARE PROVEN TRIED AND TRUE BY THE EXPERIENCE OF MANY OTHERS. THIS MAKES IT EXTRAORDINARILY DIFFICULT SOMETIMES TO BUILD AN ADEQUATE EXPERIENCE ON WHICH TO JUDGE THE MERITS OR DEMERITS OF A NEW ANAESTHETIC SYSTEM.

ANOTHER FACTOR IN GOVERNING THE CHOICE OF ANAESTHESIA IS THE DIFFERENT MEANING TO DIFFERENT ANAESTHETISTS OF THE ILLNESS WHICH CHANGES THE PHYSICAL CONDITION OF THE SURGICAL PATIENT AS HE COMES TO OPERATION. THE PATIENT WHO SUFFERS FROM CARDIOVASCULAR DISEASE, CHRONIC PULMONARY DISEASE, MALNUTRITION, ANEMIA AND OBESITY -- TO CITE A FEW COMMON DISEASES — PRESENTS CLINICAL PROBLEMS TO THE ANAESTHETIST WHICH ARE MANAGED DIFFERENTLY BY DIFFERENT PRACTITIONERS. FOR EXAMPLE, IN ONE VIEW OF CLINICAL PRACTICE, THE PRESENCE OF SEVERE PULMONARY EMPHYSEMA INDICATES TO THE ANAESTHETIST THAT HE MUST USE A NON-POTENT GAS LIKE NITROUS OXIDE OR ETHYLENE WHICH EQUILIBRATES QUICKLY. FOR HIM, RESPIRATOR TREATMENT IN THE POSTOPERATIVE PERIOD IS OFTEN ESSENTIAL. TO ANOTHER EQUALLY COMPETENT ANAESTHETIST, EMPHYSEMA MEANS THAT THE PATIENT MUST HAVE SOME FORM OF REGIONAL ANAESTHESIA OR, IF THIS IS IMPOSSIBLE, THAT

UNDER NO CIRCUMSTANCE MUST HE BE ALLOWED TO HAVE CONTROLLED RESPIRATION. THESE DIFFERENT INTERPRETATIONS OF THE MEANING OF DISEASE ARE INTERESTING. RARELY DOES THE CLINICIAN DESCRIBE IN RATIONAL TERMS HOW HE ARRIVED AT HIS METHOD OF ANAESTHETIC ADMINISTRATION FOR THESE SEVERELY ILL PATIENTS.

THE SURGICAL PROCEDURE ITSELF VERY OFTEN GOVERNS THE FORM OF ANAESTHETIC PRACTICE. THIS IS ANOTHER ONE OF THE SILENT BACKGROUND PROBLEMS THAT IS DISCUSSED ONLY OCCASIONALLY AND OFTEN IS AN IMPORTANT ALTHOUGH UNCONSCIOUS FACTOR IN THE ANAESTHETIST'S METHOD OF APPROACHING HIS PROBLEMS.

THERE ARE, FOR EXAMPLE, GREAT DIVERGENCES OF OPINION AMONG SURGEONS OF THE WESTERN WORLD AS TO HOW CERTAIN TECHNICAL PROCEDURES OUGHT TO BE ACCOMPLISHED. IN GENERAL, AMERICAN SURGEONS OPERATE AT A MUCH MORE LEISURELY PACE THAN EUROPEAN SURGEONS, AND DEFEND THEIR POINT OF VIEW BY STATING THAT SUCH FACTORS AS BODY WATER, ELECTROLYTE DISTURBANCES AND WOUND HEALING ARE LESS DISTURBED BY MORE DELIBERATE SURGICAL PACING THAN BY RAPID OPERATIONS. MANY EUROPEAN SURGEONS TAKE A CONTRARY VIEW AND STATE THAT THE MORE RAPIDLY AN OPERATION CAN BE PERFORMED EFFICIENTLY, THE LESS EXPOSURE THERE IS OF THE PATIENT TO THE NOXIOUS ELEMENMTS OF SURGICAL TRAUMA AND ANAESTHETIC INJURY. THIS IS NOT THE OCCASION TO ATTEMPT TO SOLVE THIS DIFFERENCE OF OPINION; BUT IT IS THE OCCASION TO STRESS THE FACT THAT THE ANAESTHETIST WHO HAS TO PROVIDE ADEQUATE CLINICAL ANAESTHESIA FOR A GASTRECTOMY OF FIVE HOURS DURATION HAS A DIFFERENT PROBLEM TO SOLVE FROM THE ANAESTHETIST WHO IS PROVIDING CLINICAL ANAESTHESIA FOR THE SAME OPERATION OF ONE AND A HALF HOUR'S DURATION. EVEN THE CHOICE OF MODIFYING ELEMENTS IN ANAESTHETIC PRACTICE, SUCH AS THE INDUCTION OF DELIBERTE HYPOTENSION, ARE ALSO GOVERNED BY THE TIME REQUIRED FOR OPERATION. THIS PRACTICE, WHILE ENTIRELY SAFE UNDER CERTAIN CIRCUMSTANCES, COULD EASILY BECOME A SERIOUS HAZARD SIMPLY BY PROLONGED OPERATIVE TIME. THE CHOICE OF MUSCLE RELAXANTS ALSO IS

INFLUENCED BY THE TIME REQUIRED FOR SURGICAL INTERVENTION. CERTAIN LONG LASTING MUSCLE RELAXANTS FOR WHICH INEFFECTIVE ANTAGONISTS EXIST CAN BE USED UNDER THOSE CONDITIONS WHERE OPERATION IS KNOWN TO PROCEED AT DELIBERATE SPEED OVER A PERIOD OF SEVERAL HOURS. THE NEED FOR EITHER A SHORT ACTING MUSCLE RELAXANT, OR A MUSCLE RELAXANT THAT CAN BE ANTAGONIZED WITH CERTAINTY, IS ESSENTIAL WHEN THE OPERATIVE DURATION IS SHORT.

THE USE OF ELECTROCAUTERY FOR SURGICAL PROCEDURES VARIES CONSIDERABLY IN DIFFERENT PARTS OF THE UNITED STATES AND VERY LIKELY ELSEWHERE. ANAESTHETIC PRACTICE IS INFLUENCED BY THIS CIRCUMSTANCE. CAUTERY MAKES IT NECESSARY TO ABANDON OTHERWISE USEFUL FLAMMABLE ANAESTHETIC AGENTS TO AVOID THE HAZARD OF EXPLOSION. SINCE MANY OF THE NEWER TYPES OF DIAGNOSTIC AND THERAPEUTIC APPARATUS IN THE INCREASINGLY COMPLEX SURGICAL VENTURES HAVE BECOME AVAILABLE, IT BECOMES MORE SENSIBLE TO USE NON-FLAMMABLE METHODS RATHER THAN TO ATTEMPT TO PROTECT EACH APPARATUS IN A MANNER THAT IS QUITE UNREALISTIC.

SOME COMMENTS MUST ALSO BE MADE ON THE PERSONALITY, CHARACTER AND DISPOSITION OF THE SURGEON AND HIS INFLUENCE UPON ANAESTHETIC PRACTICES. REFERENCE IS NOT MADE TO THE PERSONAL LIKES AND DISLIKES OF SURGEONS WHICH EACH ANAESTHETIST SOLVES IN HIS OWN WAY. PARTICULAR REFERENCE IS MADE AT THIS POINT TO THE MORE SUBTLE PSYCHOLOGICAL ELEMENTS IN WHICH THE SURGEON IS LESS ABLE TO DO EFFECTIVE WORK WHEN HE IS UNHAPPY WITH THE SELECTION OF THE ANAESTHETIC. THIS FACTOR HAS PARTICULAR PERTINENCE IN PRIVATE PRACTICE. IT IS A COMPELLING ARGUMENT TO MANY ANAESTHETISTS WHEN THEY ARE NOT INVITED AGAIN BY SURGEONS TO ADMINISTER ANAESTHETICS BECAUSE THE METHODS THAT THEY CHOOSE SEEM TO RUN COUNTER EITHER TO RATIONAL PREFERENCE OR TO IRRATIONAL PREJUDICES OF THE SURGEONS. THE IMPACT OF THIS FACTOR UPON ANAESTHETIC PRACTICE MAY BE LESS IMPORTANT IN THOSE INSTITUTIONS AND IN THOSE SOCIAL ORGANIZATIONS WHERE THE ANAESTHETIST IS NOT

DEPENDENT UPON THE SURGEON FOR HIS LIVELIHOOD OR FOR SUPPLEMENTS TO HIS INCOME.

THE TEMPERAMENT, CHARACTER AND INTELLECTUAL ACHIEVEMENT OF THE ANAESTHETIST ALSO HAVE AN INFLUENCE ON ANAESTHETIC PRACTICE, QUITE APART FROM THE NEEDS OF A GIVEN PATIENT. THE ANAESTHETIST WHO SPENDS ALL OF HIS PROFESSIONAL LIFE IN THE TECHNICAL ADMINISTRATION OF ANESTHETIC AGENTS IN AN OPERATING ROOM AND IS NOT INVOLVED IN PATIENT CARE, PREOPERATIVELY OR POSTOPERATIVELY AND WHO DOES NOT RETAIN AN INTEREST IN BASIC CLINICAL AND SCIENTIFIC PROBLEMS, WILL SOON FIND THAT HE TENDS TO DEVELOP A STEREOTYPED OUTLOOK ON CLINICAL ANAESTHESIA. THIS COMMENTARY IS NOT A CRITICISM OF THE SPECIALTY OF ANAESTHESIA AS A FULL AND SATISFYING PROFESSIONAL ACTIVITY. IT IS A COMMENTARY ON THE FAILURE OF MANY ANAESTHETISTS TO DEVELOP FULL LIVES FOR THEMSELVES AND PROVIDE MAXIMUM SERVICE TO PATIENTS BECAUSE THEY ACCEPT RESTRICTIONS AND HANDICAPS OF THIS KIND. IT IS MY CONTENTION THAT THE FULL AND COMPLETE PRACTICE OF CLINICAL ANAESTHESIA IS A WORTHY AND DIGNIFIED OCCUPATION BUT THAT THE PHYSICIAN WHO PRACTICES IT MUST AVOID THE DANGERS OF DIVORCING HIMSELF FROM THE ADVANCING FRONT OF NEW SCIENTIFIC KNOWLEDGE AND FROM INTIMATE CONTACT WITH PATIENTS, THEIR DISEASES AND THEIR PROBLEMS. IF HE DOES NOT KEEP ABREAST OF NEW KNOWLEDGE AND THE PROBLEMS OF PATIENTS HE TENDS EVENTUALLY TO BECOME LESS WELL INFORMED, RESISTANT TO CHANGE, AND INFLUENCED IN HIS PRACTICE UNDULY BY THE SAFE LIFE OF THE COMFORTABLE RUT! ON THE CONTRARY, THE ANAESTHETIST WHO IS VITAL AND ALERT AS A PHYSICIAN IN THE BEST SENSE OF THIS WORD WILL FIND THAT HIS METHODS OF PRACTICE ARE MORE RATIONAL, HIS METHODS OF ADMINISTRATION OF ANAESTHESTICS ARE MORE CONSISTENT WITH THE PROGRESS OF SCIENTIFIC KNOWLEDGE, AND HE WILL HAVE PLEASURE IN THE CARE OF THE ANAESTHETIZED PATIENT. HE WILL EVEN BE ABLE TO CONTRIBUTE TO THE EDUCATION OF OTHERS -- A KIND OF PROFESSIONAL IMMORTALITY.

A WORD NEEDS TO BE SAID ABOUT SPECIAL EQUIPMENT AND ITS

INFLUENCE ON ANAESTHETIC PRACTICE. THERE HAS BEEN MUCH DISCUSSION ABOUT THE VALUES OR DANGERS OF "MONITORING EQUIPMENT". THE ARGUMENT AGAINST ITS UTILITY ALWAYS SEEMS TO BE BASED ON SUCH IRRELEVANCES AS "MACHINES CAN'T THINK" OR, "I HAVE 500 POUNDS — WHAT KIND OF MONITOR SHOULD I ORDER?" IT IS DIFFICULT ON ANY RATIONAL BASIS TO DENY THAT MORE KNOWLEDGE OF HIS PATIENT'S CONDITION WILL BE MORE USEFUL TO THE INTELLIGENT ANAESTHETIST THAN A SENSE OF INTUITION WITHOUT GOOD INFORMATION. FOR INSTANCE, IT HAS BEEN SAID BY MANY THAT THE ARRHYTHMIA PROBLEM DURING ANAESTHESIA IS A NON-EXISTENT ONE, ESPECIALLY AFTER TRACHEAL INTUBATION. ALL ONE HAS TO DO TO LEARN THAT THIS STATEMENT IS UTTERLY FALSE IS TO SPEND SEVERAL WEEKS WITH AN ELECTROCARDIOGRAPHIC MONITOR DURING THE PROCESSES OF ENDOTRACHEAL INTUBATION, ESPECIALLY IF PERFORMED ONLY WITH BARBITURATE ANAESTHESIA AND A SUCCINYLCHOLINE RELAXANT. THE ANAESTHETIST WILL BE PERSUADED BY HIS OWN EYES THAT ARRHYTHMIAS ARE COMMON. WHETHER OR NOT THEY ARE IMPORTANT IS FOR HIS PROFESSIONAL JUDGMENT TO DECIDE. BUT FIRST HE MUST KNOW THAT THEY OCCUR. THIS KNOWLEDGE MAY SUGGEST CERTAIN MODIFICATIONS IN HIS METHOD OF ADMINISTERING ANAESTHESIA IF HE DECIDES THAT THESE ARRHYTHMIAS SHOULD BE AVOIDED OR MINIMIZED. IN MANY CLINICAL CIRCUMSTANCES THE ABILITY TO KNOW MORE PHYSIOLOGICAL FACTS (E. G., THE TIDAL VOLUME, THE END TIDAL PARTIAL PRESSURE OF CARBON DIOXIDE AND THE OXYGEN TENSION OF EITHER ALVEOLAR AIR OR ARTERIAL BLOOD) CAN HAVE A SIGNIFICANT EFFECT ON THE MODE OF ANAESTHETIC PRACTICE. IT IS OBVIOUSLY NOT MY PURPOSE TO ARGUE THAT MASSES OF MONITORING EQUIPMENT ARE THE ONLY WAY IN WHICH ANAESTHESIA CAN BE PRACTICED INTELLIGENTLY. IT IS ESSENTIAL TO INDICATE THAT QUANTITATIVE INFORMATION WILL HAVE AN IMPORTANT IMPACT UPON THE WAY ANAESTHESTICS WILL BE GIVEN WHERE STABLE AND PRECISE INSTRUMENTS ARE AVAILABLE AND EDUCATION IS ACQUIRED IN HOW BEST TO USE THEM. CONTRARIWISE, IN THE IN THE HANDS OF AN OTHERWISE COMPETENT AND INTELLIGENT CLINICAL ANAESTHETIST, THE ABSENCE OF PRECISE INFORMATION

WILL PERMIT THE PERPETUATION OF IMPRESSIONS WHICH MAY BE UNTRUE, SIMPLY BECAUSE HE HAS INSUFFICIENT FACTUAL DATA. THE ARGUMENT, THEREFORE, REDUCES ITSELF TO THE PROPOSITION THAT ACCURATE INFORMATION IS HIGHLY DESIRABLE FOR THE BEST CARE OF THE PATIENT. THE ANAESTHETIST MUST DECIDE HOW MUCH INFORMATION HE CAN USE AND MUST KNOW ENOUGH TO BE ABLE TO EXERCISE PROMPT JUDGMENT IN THE LIGHT OF THE INFORMATION HE OBTAINS. SURELY HE WILL WISH TO TAKE ACTION TO MINIMIZE OR OBVIATE THOSE CHANGES IN A PATIENT'S CONDITION WHICH HE DEEMS INADVISABLE OR UNSAFE. MONITORING SIMPLY HELPS HIM DO THIS BETTER.

FINALLY, IN SUMMATION, IT IS THE THESIS OF THIS LECTURE THAT A LARGE NUMBER OF FACTORS, SOME OF WHICH HAVE BEEN CONSIDERED, HAVE AN INFLUENCE UPON THE CLINICAL PRACTICE OF ANAESTHESIA. THESE FACTORS ARE NOT NECESSARILY BASED ON SCIENTIFIC KNOWLEDGE OR CLINICAL EXPERIENCE. ATTENTION HAS BEEN GIVEN PARTICULARLY TO SOME OF THOSE ELEMENTS IN DETERMINING ANAESTHETIC PRACTICE WHICH ARE NOT OFTEN DISCUSSED. MANY COMPETENT CLINICAL ANAESTHETISTS ARE UNAWARE OF THEIR FORCE AND OFTEN WILL DENY THEIR INFLUENCE ON THE PRACTICE OF ANAESTHESIA. THE EVIDENCE SEEMS CLEAR THAT THESE FACTORS — SOME CULTURAL, SOME SCIENTIFIC, SOME PSYCHOLOGICAL, SOME SOCIOLOGICAL — ALL HAVE, TO VARYING DEGREES, AN IMPORTANT BEARING ON HOW ANAESTHETICS ARE ADMINISTERED TO SURGICAL PATIENTS. MANY FACTORS ARE SUSCEPTIBLE OF MODIFICATION BY EDUCATION AND SOCIO-ECONOMIC CHANGE. THE ANAESTHETIST WOULD BE WELL ADVISED TO EXAMINE THEIR INFLUENCE ON HIS OWN PROFESSIONAL LIFE AND WORK TO CHANGE THOSE ELEMENTS WHICH RETARD THE GROWTH OF HIS SPECIALTY, INTERFERE WITH THE BEST CARE OF PATIENTS, AND OBSTRUCT THE DEVELOPMENT OF SCIENTIFIC RESEARCH AND VIGOROUS EDUCATION.

IT IS APPROPRIATE TO CONCLUDE WITH FRANCIS BACON'S THOUGHTS THAT KNOWLEDGE SHOULD BE DEVELOPED FOR THE BENEFIT AND USE OF MAN, THAT IT SHOULD "NOT BE AS A COURTESAN, FOR PLEASURE AND VANITY ONLY, OR AS A

BOND-WOMAN, TO ACQUIRE AND GAIN TO HER MASTER'S USE; BUT AS A SPOUSE FOR GENERATION, FRUIT AND COMFORT."

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