Knowing through experience that subjects having an identical handicap do not use their motor capacities in the same way, it seems impossible from the outset to give instructions as regards sports or sports activities which may be proposed in relation to the shortcomings posed by lesions to the peripheral neuron, to which may be added lesions to the medulla in order to differentiate fully between these forms of cerebral motor impairments.

Although their aetiology may be dissimilar, they all have in common reasonably significant motor difficulties affecting areas of varying size, all topographies being possible, from the tetraplegic form to sectional impairments affecting only the root or the end of a limb.

Often complicated by growth, sphincteral and sensory difficulties as well as by deteriorations in digestion and circulation, residual, flaccic or spastic paralysis, in the case of medullary injuries are associated with

— frequent deformations of the trunk or other limbs, resulting from agonist-antagonist muscle imbalances giving rise to serious muscular-tendinous, aponeurotic or capsular retractions:
  — within the spine, as they may induce scoliosis which may:
    dorsal, superinduce or accentuate respiratory difficulties,
    lumbar, bring about or aggravate a shifting of the pelvis with a risk of dislocating the hip by adduction, or skin injuries (slough) of varying significance in the case of associated sensory disturbances;
  — affect joints as possible factors in flexions of the elbow (biceps) of the hip
(psoas, hip-bone, fascia-lata tensor etc.) or knee (ischium, tibia), club foot (sural triceps) etc.;
— occasional para-osteopathy (osteoma) which may restrict or totally prevent the normal functioning of a joint and may result in, as with the above deformations, limits in functional capabilities.

All of the above conditions may require, in numerous instances, that subjects wear various devices ranging from an orthopaedic corrective corset for walking (plaster cast, reinforced leather or synthetic material) with or without hood, to a urinary apparatus.

It is thus understood that, apart from whether or not the impairment is to develop further, (which from the outset changes the prognosis and may result in forbidding competition sport while at the same time permitting recreational sport provided that it is not harmful and will not induce more advanced stages of the illness), the doctor must take into consideration all these elements in suggesting a given activity over another (in agreement, when this is possible, with the sports instructor whose knowledge as regards the possible risks and complications will enable him to meet the needs for motor consumption in the conditions most beneficial to the subject).

Lastly, the doctor must take into account certain ideas which alone dictate the choice, analysing the minimal motor capacity required for an acceptable performance in a given sport and in an instance where the handicap would be regarded as minor in everyday life; thus, radial paralysis would be incompatible with “throwing” events and paralysis of the sural triceps would render “racing” and “jumping” difficult, if not impossible.

For this reason, it is inconceivable to draw up a precise, plan of recommendations, such a plan being left to medical discretion based on the particular circumstances of each case.

Thus, the following brief study of sports currently engaged in by peripherally neurological handicapped persons does not concern itself with a greatly varied range of disabilities, but rather with the interest and the possible risks which may arise from them in a general sense.

ATHLETICS

This sport may be practised by the physically handicapped who are “mobile” or in “wheelchairs”. For both groups, events are virtually modelled after those existing for non-handicapped athletes.

These events include:
— races, involving sprints, middle and long distances and relay with additional events such as speed slalom and gymkhana for wheelchairs and race walking for certain mobile handicapped persons.
— throwing, shotput, club, javelin (distance and precision) and discus for all participants.
— jumping, long jump and high jump exclusively for certain mobile handicapped in whom residual paralysis is not incompatible with such activity.

To be included along with these disciplines are:
— pentathlon and triathlon according to sex, for wheelchairs.
— triathlon for mobile persons.

The distances for the races and the weights of objects to be thrown vary, naturally, in accordance with age, sex and the handicapped person’s classification. All these events are staged under identical conditions on the same track, in the same playing area and with the same regulations as those applied for non-handicapped persons.

As in the case with basketball, athletics is a major sport for the handicapped person in a wheelchair. The sprint, long distance and slalom events require perfect control of the chair, great muscle power, strength and endurance and at the same time improve the body’s general conditioning and self-sufficiency, thus providing an explanation why these exercises are part of the basketball player’s training.

Athletics being an individual sport, conditions which would recommend against participating in it are the same as those for sport in general when such conditions are not of a nature specifically related to the handicap (a genu-recurvatum, even a mild case, a talus valgus or even a moderate varus for instance may be aggravated by repeated jumping or throwing).

Accidents in the sport are rare and risks minimal if normal training procedures are respected (insufficient muscular warm-up). Some lesions affecting the meniscus, joints or tendons may be encountered, however, frequently as a result of brutal contractions of certain muscular groups in running or
throwing (for those both “mobile” or in “wheelchairs”), as well as in jumping where a poorly executed landing may be the source of any sort of injury (particularly as regards a monoplegic for example).

**BASKETBALL**

This is the only sport practised collectively in wheelchairs.

Combining speed, recreation, balance and precision shooting, together with the tremendous skill involved in maneuvering with a wheelchair, basketball is surely the complete sport in addition to being very spectacular. It requires a team effort wherein each individual finds his place in terms of friendship, physical exertion, technical prowess and strategy.

Each player achieves the highest level or the supreme limit of his functional capabilities developing to the utmost the muscles essential to his being, large dorsal and spinal muscles involved in forms of the most advanced medullar lesions.

Owing to the importance of the physical involvement (comparable to football or rugby for non-handicapped persons), this is a sport restricted in competition to well-conditioned athletes, but which, in a recreational setting, can be an excellent means by which, through a game, the wheelchair user can forge the “rapport” with his chair.

Although falls may appear to be a relatively common occurrence (particularly in competition) accidents related to the handicap are the exception and, as is the case with fractures, issuing from osteoporosis (this risk being diminished by the wearing of walking braces) or from ischiatic sloughs, the occurrence of which cannot necessarily be blamed on the sport. The relationship between cause and effect is moreover not always clear (whatever the origin of such difficulties there will always be a reason to suspend the practice of sport or any activity requiring a sitting position).

A certain minor traumatological tendency may, however, be noted with regard to hands, owing to a lack of both techniques and protection and to the occasionally violent contact between wheelchairs or to chaffing in blistered regions, superficial wounds, inter-phalangeal or metacarpal-phalangeal sprains with no long term consequences. This tendency, as is the case with certain cases of tendinitis or “contractures” observed in supraspinal biceps and triceps among experienced players, may be treated simply with rest, or in the case of repeated difficulties, a change in sports orientation.

**CYCLING**

Practised particularly by amputees in singles and by sightless persons in tandem, cycling’s popularity has increased among neurologically handicapped persons whose condition, in the majority of instances, results from the after-effects of poliomyelitis and cases of radicular or truncal paralysis.

The sport may be subdivided into two sections:

— **Cyclo-tourism**, involving the organisation of bicycle outings or rallies, intended for all;

— **Events taking place in the form of races** on a flat course on the road from 2.5 to 3
kilometres in length to be covered a
given number of times, without exceeding
a maximum of 30 to 50 km., and
restricted to cyclists whose training has
been controlled and checked and who
are at least 17 years of age.

An excellent means of re-education, the
sport develops in particular the lower limbs
and the buttock area, in addition to the para-
vertebra and not to mention the upper limbs
whose muscular work is far from negligible,
particularly during the final sprint stages of
a race.

Its ventilatory effects are very important as
are its effects on the heart with slow
rhythms being encountered frequently.
Cycling is discouraged for persons suffering
from:
— anterior spinal deformities ;
— difficulties with balance ;
— neurological lesions involving loss of
sensitivity in both lower and upper limbs
(one must be able to “feel” the
handlebars and especially the brakes)
and naturally in the area of the buttocks,
as anaesthesia in this region is not
compatible with a good skin condition,
continuous friction even being the root
cause of lesions in “healthy” subjects.

Incidents or accidents are especially of a
traumatic nature, caused principally by falls
or a foot caught in a toe-clip which may
result in various fractures in upper limbs or
the skull (hence, the required wearing of a
helmet). Injuries may also be the result of
errors in purchasing or adjusting equip-
ment : lumbar pain, cramps etc. often
induced by a seat adjusted too high or a
toe-clip too low.

FENCING

Mobile or in a wheelchair, fencing, with the
regulations slightly modified in the second
instance, is practised with three arms,
notably :
— foil (men and women) ;
— épée (men only) ;
— sabre (men only).

Stationary or mobile (the wheelchairs being
locked to a fastening device), fencing
demands the same qualities : suppleness,
speed, muscular strength, good stability,
self-control and concentration, a competitive
spirit and tempered aggressivity.

This sport requires serious preparation in
terms of physical effort and techniques.
Extreme nervous tension is also a part of the
sport making it desirable to complement it
with a sport considered relaxing, as with
swimming for example which would modere-
rate its disproportionate nature (thus making
it unsuitable for subjects suffering from evo-
lutive curvature of the spine), but outside
periods of competition if such is the case,
owing to its sedative action.

To avoid all serious accidents which,
fortunately, are the exception, it is vital that
the athlete’s equipment be in excellent
condition (mask, fencing jacket, guards,
blades, gloves).

Most frequent are incidents involving epi-
condylitis or tendinitis, particularly in seated
fencing, as deltoid supraspinal and long
biceps remain under practically constant
tension. Such injuries may result in the
cessation of this activity either temporarily
or permanently, prono-supination becoming
difficult if not impossible.

Lastly, haematosis from sabre blows reoc-
curs quite regularly and though not serious
requires time to heal.

WEIGHTLIFTING

An individual sport, weightlifting might seem
tedious to those not wishing to confront the
“bar”. Restricted in competition to those
who, of solid and muscular build, are suited
to this sort of activity by virtue of an initial
morphology, the “press”, the only movement
in use, is effected while lying down to avoid
excessive weight on a vertebral column
already rendered fragile by a traumatism in
the majority of cases. Its contribution is
made essentially to the muscles of the
scapular girdle as well as to the thoracic
muscles : sectoral, deltoid, trapezius, triceps.

For this reason, weightlifting is very popular
among paraplegics-who excel at it, often
obtaining better results than non-handi-
capped weightlifters, a phenomenon emanat-
ing from the fact that the sport is practised
widely as a musculation exercise in the re-
education process.

Subject to functional tests for rigorous effort
and electrocardiograph checks, weightlifting
poses no dangers.

Developing strength to the detriment of re-
lexation, training can begin only at the age of
16 to 17 and then on condition that correct techniques are to be used and that lifts are not to exceed one half of body weight.

From the age of 20, training can be carried on as with an adult, but only among boys, although no grounds or regulations prohibit weightlifting among women.

SWIMMING

Swimming has the special features of:
— putting the subject in an environment different from his natural element;
— placing him in a condition of weightlessness;
— serving as a suitable contrast to muscular work.

The unfamiliar aquatic environment is most beneficial for all neurologically handicapped patients.

Those with the greatest afflictions are able to perform movements in water which would otherwise be difficult to achieve without the assistance of orthopaedic devices or other persons, and the subject thus has the opportunity to use his weak muscles.

The sport is also beneficial for those whose spine conditions necessitate relaxation which is restricting in the normal environment.

Its benefits have already been described in detail. It may be recalled that swimming:
— aids balance and co-ordination;
— maintains or helps in regaining suppleness in the joints;
— plays a role in musculation;
— improves endurance and vital force capacity;
— provides self-confidence, etc.

Although non-traumatising and not incurring any risks in competition, swimming as a leisure pursuit is often associated with accidents, often serious but always due to carelessness or to excess exposure in the water.

Conditions regarded as a deterrent to swimming are few and may be grouped into classical otorhinolaryngological infections, conjunctivitis, cases of mycosis and dermatosis to which may be added, naturally, serious rhythm difficulties, cardiac insufficiencies for which proper compensation was not given and bronchopulmonary afflictions.

Particular problems may arise from:
— sphincteral difficulties; bowel movements and urination are to be attended to before the subject enters the water. It must be recalled that the cold and the effort may cause uncontrollable "releases" which may be limited by wearing a condom or plastic shorts under the swimming suit;
— superficial sensitivity difficulties, the result of sloughs induced by a shock or repeated chafing on the edge or the bottom of the pool as well as when entering or leaving the water;
— thermo-regulation difficulties, particularly marked in subjects with high paralysis and tetraplegics.

Extended surveillance for these subjects will result in their being taken from the water before the chilling of the body brought on by the water and which, if not observed, results in a decrease in central body temperature.

— spasticity - cold or lukewarm water can exaggerate this condition:
through either an extension of the lower limbs which does not inhibit floating but which may nullify certain motor capacities, or through bending which impedes progression. There are four types of strokes from among which, in due consideration of the swimmer’s ortho-neurological condition one may be chosen to exercise or to develop specifically a given muscular group.

Breaststroke

Great strength is required to achieve good performances in competition. The effort is even more intense in a subject deprived of the use of his lower limbs which move less quickly than is the case with either the crawl or the backstroke. Under the same conditions a lumbar lordosis, often harmful, could thus be aggravated.

The butterfly

Tiring but spectacular, this stroke demands good lower limbs and the ability to extend upper limbs well in the air in a forward motion. It is within the capabilities of only a few handicapped persons specifically suited to this activity.

The crawl

Efficient with a good technique (difficulties are encountered in rotating the head and neck for side inhalation). The motor action
of upper members takes precedence over that of the lower members entailing thoracic suppleness and spinal rotation.

The backstroke
This stroke enhances buoyancy by its extended body position and allows for thoracic expansion by alternative maximal antipropulsion of the arms and increased softening of the dorsal cyphosis, the spine being in a neutral position. This stroke is the least tiring and the most beneficial in terms of respiration with no difficulties as the face is not immersed. It is within the capabilities of “all” neurologically handicapped persons.

Swimming, the complete sport:
— as a recreation sport has the advantage of not requiring prior training if the competitor remains with short distances,
— as a competition sport requires many hours of work and many kilometres of daily training in order to excel.

TABLE TENNIS
The “game” nature of this sport tends to reduce it to a secondary discipline. However, whereas “ping pong” players are many, the real enthusiasts of this rewarding sport are more difficult to find.

The great interest in the sport among handicapped persons can be explained by competition placing two players face to face with even the most serious cases, such as tetraplegics, able to play with the racket placed in the hand.

An excellent exercise in balance for both “mobile” and “seated” subjects, table tennis — requires and cultivates:
— rapid movement,
— suppleness in the joints within the upper limbs,
— great concentration in order to foresee and counter the opponent’s shots;
— brings into play the entire muscular system;
— demands dexterity and self-control;
— creates, through repeated actions, co-ordinated and less tiring automatisms.

With no difficulties presented, the only incidents that may be mentioned are those caused by fatigue from effort, especially in cases of high paraplegia and tetraplegia which may result in some instances of artostatic hypotensors, alleviated by wearing an abdominal strap or reinforced stockings, with the amount of time at competitions requiring physical effort properly spaced, provision being made for sufficient resting periods between each set and each match.

ARCHERY
One of the longest-standing sports among the handicapped, archery remains the most popular for paraplegics and other disabled persons (approximately 80% of all archers), as the result of three factors:

1. Subjects may be taught the rudiments of archery quite early, ideally at about age 10, and the sport is within the grasp of those in training up until a very advanced age, long after they will have given up the idea and lost the physical capabilities of shining in another specialty.

2. It requires a musculature fulfilling the characteristics of the following neurological category: good upper limbs with a good scapular girdle, and secondarily, good spinal and abdominal qualities, as archery depends more on the back and shoulder than on the arm and forearm. Involvement in the sport is thus not possible, or at least very difficult for those with disabilities in these regions, even if the disability is of a limited nature.

3. The sport enables them to pit themselves against non-handicapped archers, with no classification or corrective coefficient.

For the great benefit of subjects confined to wheelchairs, archery:
— helps to combat the difficulties associated with the static nature of life in a sitting position by requiring force to be set against resistance with certain muscles which are used very little if at all in everyday activities (which favours in a preferential manner a certain number of muscles to the detriment of others, giving rise to faulty behaviour over periods of many years; hardening into cyphosis, closure of the rib cage, retraction of the pectorals...). These include, among others, the middle and lower trapezoids, rhomboids, deltoids, posterior and spinal;
— enables subjects to acquire a full mastery of respiratory rhythm by maintaining the
capability of remaining completely still while several muscles are contracted against great resistance;
— develops resistance to effort through the repeated “volleys” made over long periods of time without muscle fatigue being felt;
— provides, in addition, dynamic effort in the recovery of arrows, which involves covering several kilometres on occasion, as in the case with a FITA range for example.

There are no conditions inhibiting participation in archery apart from serious vision anomalies or uncontrollable abnormal movements. If these instructions are followed on the archery range, no accidents can really occur. The only accidents which may be noted are rare: cases of expitrochlitis in the arc hand, tendinitis in the shoulders, stiff neck or lumbago resulting from bad shooting positions.

SHOOTING

This sport may be practised by almost all neurologically handicapped persons, seated or mobile in accordance with the topography of the motor after-effects of shooting with or without a support.

Shooting may be subdivided into:
— hunting arms with clay pigeons (skeet)
— extended arm shooting, with moving or fixed targets:
  — compressed air rifle from 10 metres;
  — 22 calibre rifle from 50 metres;
  — compressed air pistol from 10 metres;
  — 22 calibre pistol from 25 metres.

As in the case with archery, the handicapped shooter can compete against non-handicapped athletes without any restrictions.

Orthopaedic devices are permitted provided they do not come into contact with the arm.

Even with special rifles mounted on a support, intended for the most seriously handicapped, the benefits involving regulated breathing and self-control are vital and are the main interest, muscular work being less important, for instance, than with archery.

Nonetheless, shooting with hand weapons requires isometric contractions of the wrist muscles, the flexors of the forearm, of the deltoid; the complete immobility, required throughout the rest of the body during the motion of pressing the trigger with the index finger, in an anti-physiological position (in profile in relation to the target) is very fatiguing.

The obvious conditions incompatible with shooting are of an opthalmological (inability to correctly evaluate distances, for example) or neuro-psychiatric (epilepsy and behavioural problems) nature. Age is not a consideration as, in contrast with numerous other sports, it is not necessary to begin very early to become a good shooter. However, the use of a firearm should be permitted only with a child aware of the danger that it could represent and of his responsibility.

This somewhat lengthy enumeration of sports open to peripherally neurological handicapped persons would not be complete if mention were not made of certain sports certainly worthy of interest but practically restricted to “certain cases of
privileged handicapped persons”, if one may be permitted to say so, who may take part with varying degrees of success in certain sports of lesser popularity which are not well liked or perhaps avoided.

Here are some examples:

Horsemanship, among the more important advantages of which is the close contact existing between the rider and his living and intelligent mount. The sport is not recommended for cases involving anaesthesia of the buttock area, although some have tried. This is an enriching and attractive therapeutic recreation.

Football, which, given the violent physical contact, can be dangerous for those subjects who are “too” handicapped, integrated with those having “lesser” handicaps.

Skiing. Though more and more numerous on the slopes, poliomyelitics, partial paraplegics or persons afflicted with radicular or truncal handicaps still represent a minority among the amputees and blind persons involved in Alpine and cross-country skiing as well as ski touring. Differentiations are made in accordance with each subject’s capability in skiing, with or without stabilisers, legs with or without reinforcement etc...

Yachting. Many different categories of handicapped persons may form crews, often of a very heterogeneous composition with polio victims, amputees and blind persons shoulder to shoulder. Paraplegics with sub-organic anaesthesia (risk of sloughs) must undergo a very thorough medical examination.

Volleyball. A team sport for “mobile” handicapped persons, it may be played in complete security, as there is no contact between opponents and none, except under exceptional circumstances, between teammates. It is to be regretted that this very complete sport is not properly appreciated in its own right.

Lastly, bowls must be mentioned, including pétanque whose pioneer, it will be recalled, was a paraplegic confined to a wheelchair. As a game or sport, bowls is an excellent leisure pastime and is to be included among those physical activities related to sports activities with high performance levels or requiring a great deal of special techniques as is the case with weightlifting or fencing, and “all” handicapped persons may excel through their skill, either among themselves or with non-handicapped competitors.

Although the idea of using sport in therapy is not a new one, as even ancient civilisations were aware of its benefits, it was not until the Second World War that it was used as a complementary element in successful readaptation and considered as a possible recreational activity.

Introduced in hospitals in 1945 by Dr. Guttmann, head doctor at the Re-education Centre for medullar injuries in Stoke-Mandeville (Great Britain), it first officially appeared in France in 1954 where sports meetings subsequently took place giving the movement a competitive nature.

Since that time, it has made progress throughout the world without, however, yet occupying the place it deserves in our society alongside traditional sports, and it is not always easy for a handicapped person to practise the sport most suited to him, the sport of his choice.

To fulfill the needs of the movements, solutions do exist:

— constantly, in the family environment;
— frequently, in institutions with residences (professional cure centres);
— occasionally, in an open environment: traditional clubs;
— most often, in a more closed environment: associations affiliated to the French Handisport Federation.

It is within the family milieu that psychological action can and must begin with the aim of guiding the young subject, with a doctor’s approval, towards a physical broadening which is always within reach. Such a process also involves combatting the harmful tendencies of idleness which are facilitated by protective and secure surroundings. Some children have surprising precociousness which is easy to channel within the bounds permitted by introducing them to games in the swimming pool, on the archery range or with bowls or a ball, through the help of the father or a brother. This introduction allows for a good beginning with regard to environment, space and time, developing the relationships between children themselves, between children and adults and between the handicapped and the non-handicapped.

Staff at a motor re-education or a professional readaptation centre with or without residence facilities could mix persons whose handicaps vary in terms of seriousness. A desirable idea, this mixture should not
hinder the organisation of physical activities, the programme of which will pace individuals with differing physical capabilities on the same plane (table tennis between amputees and paraplegics, swimming sessions in common, etc.). The programme may also be drawn up with reference to age groups, strength and similarities or analogies in terms of handicap (basketball for those confined to wheelchairs, volleyball for mobile subjects, etc.).

These centres are generally equipped with sports facilities and with knowledgeable staff capable in such matters for including re-education and study programmes into the free time allocated by the daily or weekly programme alongside regular care, all organised in close collaboration with medical officials.

Introductory and advanced training may be carried out under good conditions, and intercentre, local, regional and even national meetings inspire a motivation, the benefits of which are felt at all levels.

Upon leaving these institutions, the child or adolescent returns to his family and the activities already begun must be continued without delay.

It would seem to be ideal to integrate the subject with non-handicapped persons in accordance with his capability to use the facilities without any major difficulty and to follow the prescribed progression without turning him into a special case.

Due consideration must, however, be given to occasional moderation as dictated by medical circumstances.

This desirable formula is unfortunately not applicable to all disciplines but may be used with archery, table tennis, shooting and, subject to individual cases, swimming, sports for which a specially trained staff is not vital, a basic training sufficing.

The problem is not the same for horsemanship for example, which requires specially trained riding experts, nor with basketball, in which equipment is needed (wheelchairs) and in which, as a team sport, other players must fulfil the same conditions.

In France all departmental “Youth and Sport” bodies are able to provide addresses and sports information on the clubs within their district.

Those often insurmountable difficulties encountered in practising sport in an open environment (architectural barriers, special material, insufficient medical surveillance, a lack of staff or of specialised technicians, etc.) and the increased ease with which handicapped persons have made contact among one another, together with the desire to assume control of their own affairs, have led to an increase over the past twenty years in France in the number of multi-sport associations exclusively for the handicapped whose recreational and competitive sport may be practised.

Organised in accordance with existing regulations, these associations are grouped within the French Handisport Federation with regional committees covering the length and breadth of our country.

Officially registered on a regular basis, they carry on activities by offering a variety of guarantees to members both in the technical and medical realms and are intended to (prepare young people for tests connected, as an option, with various school examinations such as the CAP (technical diploma), the baccalaureat, etc. which handicapped candidates can take in the same way as do their non-handicapped friends.

A booklet updated from time to time, “Rendez-vous at the stadium”, which gives all information regarding their addresses, doctors and the sports offered, is available to anyone requesting it from the headquarters of the federation which edits the publication.

More and more means are thus being made available to encourage the young handicapped person to become integrated into the adult world with the best conditions possible; it is incumbent upon the parents, educators and doctors to co-operate in order to instill within the child a taste for physical and sports activity, a vital element in social development.

A. B.