THE BIG TROUT THEY USED TO GET

Fish Stories Still Told to Anglers Who Whip the Delaware Valley Streams.

A BOY AND A SIX POUNDER

Some Giant Mossbacks May Be Left—If So They Are Too Wise to Bite.

Destruction of Trout Due to Minks, Turtles, Cranes and Others of Their Natural Enemies—Science Has Discovered That Fresh Water Eels Breed in the Ocean Depths and Is Thus Solving an Age Long Mystery—Measures for Comfort of Fishes in Aquarium.

"Every angler who knows the real pleasure of fishing for brook trout," said a Pike county man, "will agree with the fisherman who said in THE SUN that half the charm of it is lost to the man who fishes from the bank; who whips the stream before it can be waded with a tingling sensation of comfort from contact with the water.

"As matter of fact, even if the following of a trout stream did not, to the genuine sportsman, depend for its greatest charm on plunging into the stream and wading it as he fishes, there are trout streams in the Delaware Valley in which it is useless to whip with fly or dabble with worm unless the angler wades. There is at least one stream in Pike county which is impossible of being fished in unless the angler makes up his mind to keep in the water from the time he enters it until he emerges within a mile or so of its mouth. That stream is the Adams Brook, six miles below Milford, one of the best streams for trout anywhere, but known only to the most venturesome of anglers.

"From its source to its junction with the Delaware River, a flow of five miles this wild stream has a fall of more than 500 feet. Once in the creek the angler has no choice but to stay in it if he wants to fish it. To get out he must either retrace his steps, which is a difficult matter if he has made his way down the brook a mile or toil up to the summit of a steep and laurel tangled ridge which rises from the water on one side to the height of 500 feet, the other side of the creek being a rocky, cañonlike wall, in places a hundred feet high and rising sheer.

"Adams Brook is a succession of falls for almost its entire course, and the man who fishes it must expect to clamber down almost perpendicular ledges and edge around dank pools too deep to be waded, on the brink of yawning chasms or swim such pools to places of safer foothold.

"It is needless to say that Adams Brook is never fished very early in the season, and it is not overrun with fishermen at any time. Only the boldest visit it and brave its difficulties and dangers. The trout that come from its depths are all very large, dark like the waters in which they dwell and with their crimson spots exceedingly bright.

"With the exception perhaps of the still waters of the upper Shohola Creek in Pike county and the deep pools of the Mongaup and Neversink in Sullivan county, New York, no trout stream tributary to the Delaware yields larger trout than Adams Brook; but the man who gets any of them has the angling job of his life on his hands.

"Speaking of big trout, by the way, the Delaware Valley streams as a rule are notable more for the number of trout they yield during the season than for the large size of the fish, this reference being solely to the native wild trout, although the average size is good and many very large ones are taken. While the streams of Pike county and other counties bordering on the upper Delaware are fished perhaps by a greater number of expert visiting anglers every year than are those of any similar trout region in the country, it is not a common thing that native trout weighing more than a pound and a half are killed nowadays. Not so many years ago two pound and even four pound specimens were by no means rare. If the wild trout caught in any of the Delaware Valley streams at the present day average half a pound the catch will be exceptional.

"Milford, Dingmans and other villages in the Delaware Valley have grown to be among the most popular summer resorts near New York, and the trout streams have done much to make them so. In fact the fishermen who made annual pilgrimages to this region in the early days were the first to bring it into notice as a locality eminently fitted for a summer retreat for city people.

"For forty years or more a painting of an enormous trout on one of the big square columns of a hotel piazza in Milford was a prominent attraction to all sojourners in the place, and when for some reason it was painted out by an unappreciative new proprietor of the ancient hostelry a memorable piscatorial record of Pike county disappeared. The picture is gone, but the memory of the trout of which it was an exact representation is still green, and to this day the visiting sportsman in Milford is invariably regaled with the interesting history of that great brook trout.

"It was caught by B. A. Bidder, a Milford boy. He was fishing for suckers in the Delaware River at the mouth of the Sawkill Creek. The line he used was a stout cord looped on an ordinary catfish hook. The rod was a chestnut limb he had cut at the edge of the creek. His bait was a fat angleworm.

"He had landed several suckers, when his bait was seized by a fish that rushed with it out toward the middle of the river. The boy was afraid it would break his line, so he waded after the fish until he was up to his chin in the water, when the fish turned and rushed in the creek and up it.

"The boy could not lift the fish out of the water with his frail rod, so he trailed along in the wake of the fish as fast as he could follow. It led him a chase a quarter of a mile up the creek, when it ran into a shallow place divided from the main stream by a sandbar.

"Seeing his advantage the boy fell flat in the water on top of the fish. Placing both hands under it he threw it out on land, when he discovered that instead of a monster sucker, as he had all along supposed it was, he had captured an enormous trout.

"Taking his prize up in his arms he ran home with it. The trout was the wonder of the town. No one had ever seen or heard of one so large as that in Milford, where very big trout in those days were not rare. It was shown all over the village. Some one held it against a pillar of the Sawkill House, and its outline was carefully traced with a pencil. This was afterward made vividly lifelike in oil color by an artist.

"The date on which it was caught, its size and weight, and the name of its captor were inscribed beneath it. The trout measured one inch over two feet in length, had a width of five inches and weighed a little more than six pounds. It holds the record to this day for native brook trout from a stream in the Delaware Valley region, although one taken by Charles Fenno Hoffman about the same time in White Lake, Sullivan county, is recorded as having weighed eight pounds. The brook trout that was shown in Barnum's old museum at Ann street and Broadway for years was caught in the Beaver kill in Delaware county, New York, and was said to have weighed six pounds.

"Another huge brook trout, the story of which is a classic in the trout lore of Pike county, was the one of which the late D. A. Wells of Milford made the sensational killing in the palmy days of native wild brook trout in this region. Wells was fishing in a dark, deep and almost inaccessible pool known as the Devil's Kitchen, below the Sawkill Falls, now a part of Gifford Pinchot's Gray Towers estate in Milford. On the further edge of the pool a large crown of foam was whirling about on the eddying water.

"It was a long cast away, and Wells's footing was precarious, but with the intuition of the true angler he felt that a prize was lurking beneath that foam crest worth taking risks to secure. He laid his flies deftly on the whirling foam. They had scarcely touched it when one of them was seized by a trout of such unexpected size that the angler was thrown off his guard for an instant, but quickly recovering himself he took the fish in hand.

"He stood on a narrow shelf of rock that jutted out over the dark pool, and with great difficulty maintained his balance as he watched and warded the manœuvres of the trout to free itself from the difficulty it had unwittingly got itself into. For a quarter of an hour the game fish struggled to escape. The angler had no room to step forward or retreat, and he had to trust alone to his skill in handling his rod and reel.

"The trout seemed possessed of unwearying vitality, while the angler himself was at last almost exhausted with the struggle. Suddenly the trout leaped high out of the water, an unusual bit of trout tactics, passing clear over the projecting root of a birch tree that grew on the face of the ledge on the opposite side of the pool. The leader caught on the root and the great fish hung suspended a few inches above the surface of the water.

"One twitch by the trout would now have torn the hook from its jaw and set it free, but that remarkable leap, after the long, hard fight, seemed to have been the last effort the trout could make to escape and it hung there motionless, its freedom within its reach. There was but one thing for the angler to do if he hoped to secure the trout, and he did it. He let himself down into the water from his perch on the rock and swam cautiously to the other side of the pool.

"Pausing within reach of the trout he raised his hand stealthily upward until it was beneath its distended gills. With a quick movement he thrust his thumb in the gills and the prize was his. Wells's triumphal entrance into the village with the king of that dark pool as his trophy is well remembered in Milford. The trout was 22½ inches long and weighed four and a half pounds, according to its recorded measurement and weight.

"But although there is a regrettable scarceness of big native trout that come forward in these days to reward the angler, the Pike county ancients declare it as their theory that there are just as many of the giant old mossbacks in these waters as ever. They have grown wise with age and have acquired so fine a perception of the real and the unreal that the utmost cunning and dexterity of the scientific angler can no longer deceive them into taking the artificial fly for the natural, and even the angleworm of the unskilful but lucky urchin has lost its deadly charm.

"'And by and by,' said one of these wiseacres the other day, 'these new trout that's come among us 'll git jest as wise as our smart old native chaps and folks 'll be settin' 'round sighin' over the time when they used to ketch eight and ten pounders an' now can't git one that'll heft up more'n three or five pound to save their lives, jest like we're mournin' over them two an' three pound real trout what we used to land.'

"That may or may not be so, but it's a sure thing that the time isn't very far in the future when a native wild brook trout in our Delaware Valley waters will be a curiosity worth more than a nine days gossiping about."

NATURAL ENEMIES OF TROUT.

The Crane, Turtle, Water Snake and Mink All Able Fishers.

"Few anglers, even among those of long and wide experience with trout streams, have personal knowledge of the many natural enemies of trout in the shape of animals, birds and reptiles and how persistent and industrious they are in seeking those fish as their prey," said an observant sportsman, "but any person who will spend an hour or so watching along a stream will see enough to convince him that these enemies are fishing it with great results.

"Some of these enemies are the kingfisher, the crane, the snapping turtle, the water snake and the mink. One day while fishing a Sullivan county stream I laid myself down in the shade of a maple to eat my lunch and smoke a pipe. While lying there I saw a crane drop down on the edge of the brook. After a few minutes of silent watching it captured a big trout and rose leisurely and flew away with its catch.

"Then gliding along in the water came a mink, one of the most skilful and destructive enemies the trout has. The mink swam to a deep pool in a bend of the creek and pausing a moment on the surface dived. It was out of sight not fifteen seconds and when it came to the surface it had a trout in its mouth, a plump half pounder.

"The mink disappeared around the bend in the creek and a harsh voiced kingfisher next claimed my attention as it lighted on a dead limb on a tree at the edge of the water and the next minute pounced down on a trout and returning to the limb shook the water from its feathers, swallowed the trout and put itself on the watch again for another.

"Before it got the chance for another a watersnake came gliding up the stream with a trout in its mouth. I rose to a sitting posture. The snake saw me and went down out of sight like a flash. The kingfisher flew away with an angry shriek, and doubtless went to some other spot along the creek to complete its fishing.

"All this happened within half an hour, on a stretch of stream less than fifty yards long. There was no reason for believing that the spot was the only one on the brook where similar enemies of the trout were at work.

"An angler passing down a stream, intent on his rod and line, will rarely detect any of these prowlers at their fishing, for they are all exceedingly wary and shy and disappear at the first distant sound. And they are all interesting fishers, each with ways of its own.

"Cranes and snapping turtles seem to select the biggest trout for prey. The crane usually does its fishing at the lower edge of some deep pool. Poised on one long, slender leg, as motionless as if it were a bird carved from stone, it waits patiently the passing of some trout from the rapid water into the quiet of the pool. Suddenly the long neck shoots out like an arrow and the great bill is buried for an instant in the water. The aim is rarely at fault, and when the bird's head appears in sight again a large trout is pretty sure to come up with it.

"One crane, so the fish hatchery patrol on Caledonia Creek have reported, will easily take 1,000 trout, many of them heavy with eggs, during the time it fishes, which is from the time the ice leaves the creeks in the spring until it forms again the following winter.

"The mink fishes all winter long; in fact it is during the ice bound period that this busy and hungry little beast is the most destructive to the trout.

"The kingfisher makes many a failure in its attempts to catch its fish, but failure does not discourage this fisher. He is a greedy hunter, or rather the family he feeds has an insatiable appetite, for one kingfisher has been known to return ten times to the same place within an hour and carry away a trout every trip. Kingfishers are common to all trout streams, and it would be difficult to estimate the number of trout they take from the waters.

"Water snakes, basking by the hundred along every trout stream, fish with so much tact and cunning that they number their prey by the thousand from the time they emerge from their winter sleeping places, which is as soon as the weather begins to get warm, until the approach of winter forces them to retirement in their hibernating places.

"There is no knowing to how great a degree the trout retaliate on the snakes for their warfare, but that they do make reprisals is well known to every angler for trout. Many a big trout when dressed has been found to have from one to three young water snakes stowed away in its stomach.

"It is fortunate not only for the trout but for all kinds of fish that inhabit the waters with this creature that the snapping turtle is of extremely slow growth and that its eggs are the prey of birds, snakes and muskrats, for this voracious turtle is one of the deadliest foes of the finny tribe. It may be interesting to know, too, that the eggs of the snapping turtle, so far as observation has determined, are the only thing in the nonvegetable line that the muskrat eats. The muskrat is entirely a vegetarian with that exception. Bulky and apparently clumsy as these formidable creatures are they are so quick, wily and active when hunting a stream that no trout that a snapping turtle darts after may ever escape.

"The wild duck of the woods, the wood duck, the most beautiful of all our wild fowl in plumage, is a particularly destructive enemy of the trout in isolated streams, for it hunts and devours the eggs of the trout. Always a glutton when the duck finds the spawning bed of a trout in the small waters that fill the main streams, and these ducks have an infallible instinct for finding the trout nests, it will devour every egg and look for more.

"The game law of New York protects the wood duck at all seasons, but the epicurean fox is as fond of wood duck as the wood duck is fond of trout spawn and does a great service to anglers without knowing it and regardless of the statute in such case made and provided by keeping the webfooted gourmand pretty steadily on the move from one place to the other during the course of the year."

THAT ODD CREATURE THE EEL.

Science Has at Last Discovered Its Breeding Place in the Ocean Depths.

It is a familiar fact that the salmon, the shad and other fishes come in from the ocean and ascend streams to breed in shallow fresh waters, their young returning to the sea. It now appears that the fresh water eel exactly reverses this process, going out into the ocean to breed and the young eels in due time returning to fresh water.

The breeding habits of the eel were long a mystery to the naturalist, as well as the angler, owing to the absence of eels with spawn in streams and ponds, but now this mystery has been largely cleared up, as is set forth in the *Zoological Society Bulletin* for March, which is an Aquarium number prepared by the assistant director of the Aquarium, Dr. Raymond C. Osburn.

The first step in solving the mystery was made by Dr. Theodore Gill, who suggested in 1864 that the ribbonlike pelagic fish known as the leptocephalus was the larva of the conger eel. In 1885 this was proved to be true by Delage, who succeeded in rearing the conger eel through its metamorphosis from the leptocephalus. In 1897 two Italian zoologists proved that the larva known as leptocephalus brevirostris developed into the elver, or young eel, of the common European species. Their studies were made in the Strait of Messina, in whose currents many abyssal animals are brought to the surface. Among these were found here the leptocephali of the European eel.

But the most remarkable facts regarding the breeding habits of the fresh water eel have been brought to light as a result of studies carried on in recent years by Dr. John Schmidt for the Danish Government. From these studies it appears that the fresh water eel must return to the ocean to breed and to the depths of the ocean. The presence of salt water is not alone sufficient, but certain conditions of depth and temperature are necessary, namely, an approximate depth of a thousand meters, and a temperature at that depth of not less than seven degrees centigrade.

After hatching the young gradually rise toward the surface as leptocephali, having a greatly compressed, ribbonlike form, colorless except for the iris of the eye and having the languid movement characteristic of such pelagic animals. They descend to about a hundred meters during the day, only rising to the surface at night.

After reaching a length of about three inches the metamorphosis, which lasts a year or more, begins and the leptocephalus is gradually transformed into the young elver or typical eellike form, and then the young eels gradually make their way shoreward and in the course of time ascend the streams into fresh water.

The life history of the American eel has not been so thoroughly investigated as that of its European relative, but the facts so far as known accord well with those determined by Dr. Schmidt for the European species, and the two species are so nearly similar that they would naturally be supposed to have the same breeding habits. Only one species is known on each side of the Atlantic and these are apparently kept apart by the greater depths of the middle Atlantic.

The distances that many of the eels must travel in order to reach the breeding grounds are enormous. Not only must they descend from the streams and lakes to the ocean but in order to reach a sufficient depth they must in nearly all cases make long journeys at sea.

Thus the eels living in the fresh waters of northern Europe find their nearest breeding grounds in the Atlantic southwest of the Faroe Islands, while those inhabiting the waters of the Mississippi system must migrate out of the Gulf of Mexico to the eastward and northward of the Bermudas before the proper temperature of not less than 7 degrees centigrade at the 1,000 meter line is reached.

Not the least remarkable feature of this life history is the fact, for such it seems to be, that a species capable of withstanding such changes of temperature and pressure and which is distributed from the tropics to the Arctic Circle should be so inadaptive in its breeding habits.

These habits make it impossible to propagate them by artificial methods or to establish them in other regions of the world where the special conditions of the breeding grounds do not exist. The young eels can be readily transported and will grow well in fresh water anywhere, but attempts to establish the American eel on the Pacific coast have met with no results beyond the growth of the individuals transported, and the same has been true of the attempt to plant the European eel in the Danube and other tributaries of the Black Sea.

QUEER TRICK OF A BADGER.

Its Skin Is So Loose That It Can Turn Over Inside of It.

The pelt of an adult badger is extremely thick and difficult for a biting adversary to penetrate, writes a trapper in *Fur News*, and so loosely does the skin cover the body that the animal is able to turn almost around in its hide.

Should a dog acquire a hold on the throat the badger turns himself so that the dog's grip is on the back of the badger's neck, without having loosened his first hold. Then the badger secures a vselike grip upon some vulnerable portion of his enemy, and while his long tusks penetrate to the limit he digs and scratches with his front feet, that are furnished with claws almost as formidable and deadly as might be expected from an anteater of the dark continent.

He who has removed the pelt of a badger and is at all observing does not wonder at this animal being sharp bitten and that he is able to hang with bulldog tenacity when the formation and adjustment of its laws are noted. Neither is it so much of a mystery how he manages to bore through the soil so rapidly that half a dozen men with shovels cannot overtake him, for he is a mass of cords and muscles, particularly in the neck, chest and shoulders, very similar in physical construction to the ground mole.

The badger toes inward sharply when travelling and always on the walk, twisting about here and there very much like the movements of a skunk, while if it be in winter he makes a business of hunting buried dormant woodchucks.

He is a fur bearer of rather coarse quality and there is a great range of value in the pelts taken, all the way from 10 cents to $2 or more, depending upon the length of the coat. A badger is chiefly valuable when it has a long coat, so that the guard hairs can be plucked and used to make shaving brushes.

FOR FISH COMFORT.

Many Tests Made Daily of Waters Used at Aquarium—One Unique Record.

For the better care of the fishes and various other creatures contained within its tanks and pools there is kept at the Aquarium a daily record of the density of the harbor water, which is to some extent used, and of the sea water contained in the reservoir, from which most of the Aquarium's tanks are now supplied; and there is here kept also a daily record of the temperatures of the harbor water and of the reservoir water and of the fresh water used, and also the temperature of the air inside and outside the building. All these things for guidance in setting up in the tanks and pools conditions most favorable to their tenants' well being.

By the density of salt water is meant its degree of saltness. The dense tropical water around the Bermudas is .028, which is to say that it is twenty-eight parts in a thousand salt. The ordinary sea water along our coast is .022.

The water in New York harbor, which receives the flow of a large fresh water river, commonly ranges in density between .006 and .018. When the freshets come down in the spring the harbor water at times of extreme low tide may run down in density to as low as .002. For a period of six weeks to two months in the spring the current on the surface, in the channel, is always setting out, and the surface water there, in the river, is then practically fresh.

The harbor water gets saltier here in summer, and it becomes saltest in winter, when easterly and southeasterly gales may drive in here sea water enough to raise the density of the harbor water to .018.

For a considerable time the Aquarium's salt water supply was drawn from two salt water wells driven down under it through the rocks and sand on which the old building stands. The sand through which this water was drawn served in some measure to filter it, but without affecting its density. But this water was always polluted, and for some fishes it was too fresh. Often it was necessary to salt this water artificially.

Later there was built under the surface in Battery Park outside the Aquarium a reservoir for the storage of salt water to be used in what is known as the closed circulation system. In an open system the water that flows from the tanks runs to waste; in a closed circulation system the water is used over and over again, being pumped from the reservoir to run through the tanks and thence through a filter and back again to the reservoir.

The Aquarium's salt water reservoir is kept filled with sea water of coastwise density and purity brought in by tank boats from outside Sandy Hook. The water hereabout is less dense in the spring, when the Hudson River is pouring into it its large volume of fresh water, but commonly the water thus brought from the open sea is of a density of about .022.

The density of the water in the reservoir does not always remain constant. While this water is used over and over again there is inevitably more or less of it lost in use or by evaporation. But while the water may evaporate the salt does not, and so with the same amount of salt remaining in it the smaller body of water becomes saltier. In this manner in the last year the density of the salt water in the Aquarium's reservoir increased at one time more than .024.

In such case the density is reduced by adding new supplies of salt water brought in from the same source outside. In a public aquarium in an inland city, to which salt water for the marine fishes must be transported from the coast in tank cars, when the salt water used has by evaporation come to be of too high a density they reduce it by running into the reservoir 5,000 or 10,000 gallons of fresh water; as might be done here if that course should be desirable.

The temperature of the harbor water as here taken is that of water drawn from the Aquarium's salt water wells, which, as has been ascertained by test, is from one to two degrees cooler than the open water in summer and from one to two degrees warmer than the open water in winter; it ranges from between 33 and 34 degrees in winter to between 76 and 77 degrees in summer. The temperature of the reservoir water, like that of the fresh water used, Croton, is taken as it flows into the building.

After being taken into the distributing tanks within the building the water may be more or less modified in temperature by contact with the air, and then before running it into the tanks some water must be warmed for some fishes in winter and some must be cooled for some other fishes in summer.

Wholly contained within the building is a fresh water closed circulation system for supplying cold water in summer to the tanks containing trout and some other fishes that could not survive through that season without it. For these fishes the water in their tanks is artificially cooled to a suitable temperature, and then this cold water as it flows out of the tanks is not permitted to run to waste but is pumped back to a filter without having risen much in temperature. Thus the same water is used over and over again, and with a closed circulation it can with greater economy be kept down to the required coldness.

The various fishes here, coming from many parts and many waters, require for their comfort and preservation various waters at various temperatures, and so the thermometer is here in constant use, the temperature of the water in each and every tank and pool is taken frequently every day, and day and night, to see that the water flowing into it is just as it should be.

The Aquarium is probably the one place in New York at which is kept a record of the harbor water temperatures. Civil engineers have consulted this record for information regarding the temperatures here to be met with and to be considered in under water tunnel work and in waterside construction.

SNIPE SHOOTING.

Good Marksmen Often Defeated by the Bird's Curious Gyrations.

Snipe shooting generally is best pursued on mild windy days, says *Baily's Magazine*, and the gunner's companion should be a steady pointer or setter thoroughly used to the work. It is immaterial which is employed so long as the dog acknowledges snipe well.

No better sized shot can be used than No. 8, one ounce to the charge for a twelve bore. Some sportsmen use smaller sizes, but it is a mistake. Snipe will very often carry off sparrowhail to a considerable distance or entirely escape vital injury.

When a snipe springs with its peculiar warning cry "scaipe" it darts upward either to the right or left, usually the latter, for about three or four yards, and then turns at an obtuse angle for a short, straight flight, which commonly brings it in a direct line from the gun for a couple of seconds—not longer—as a rule. Then is the moment to take it, when, if it flushed fairly close, the distance will be from twenty to thirty yards.

It is an error to fire snapshots at snipes. All birds flying from the shooter, provided they rise within twenty yards, give time for a cover if only the hand and the eye work quickly and together. But once this momentary cover has been obtained there can be no dwelling on the trigger.

The whole matter is over in four seconds at most. Should the first barrel miss there will be no opportunity for another delivery, for a snipe on the report will dart upward with amazing swiftness and then begin its strange evolutions, termed twisting by one writer. In these perplexing gyrations a snipe does not merely incline now to one side, now to the other, showing the white inside wing feathers, but dodges in the form of a corkscrew.

The orthodox method of working a snipe walk is to first beat down wind and head the dog on his point. Snipes invariably make to windward, and as they hang against the wind excellent cross shots can be had even while they are twisting, that being a sidelong movement and only disconcerting in flights from the gun.

In cross shots up to say thirty yards the aim may be very little in advance of the bill, but at forty to fifty yards from two to three feet in front may be allowed, according to the swiftness of the flight. If flying obliquely about half these allowances in advance should be made. When the down wind walk is sufficiently tried the shooter may often successfully beat it up, when he will generally come across a few close lying birds.

The accustomed snipe shooter seldom cares to fire at a jack snipe, a smaller variety with a much shorter bill, which will be recognized by their flushing silently and flying more like butterflies than birds, but they are even more delicate eating than their larger congeners.

SPEED OF A RHINOCEROS.

Chased a Hunting Party and Got Away in Safety.

Dora Vandeleur in the Empire Review.

Out he burst at last with a crashing of brush and timber, reaching the open just in front of me, stopped for a minute to sniff the breeze, then advanced at a quick trot toward my pony.

Being mounted and inexperienced, I felt a false sense of security: he lumbered toward us with surprising swiftness, yet it seemed so difficult to believe this uncouth animal bent on mischief that I simply sat still and watched its approach.

The pony stood this inaction as long as its nerves allowed, which I should judge was until the creature had got within eight or ten yards, then wheeled with a most disconcerting suddenness, and set off like the wind across the level.

Fast though the pony flew (and having caught his panic, I was urging him to do his utmost), to my horror and astonishment the rhino not only had no difficulty in keeping up, but gained.

I heard a shot, and then another, and looked back over my shoulder hopefully; the creature was coming on faster than before! A third shot came from somewhere on my right, and I felt the pony slacken his pace, evidently the last bullet had found a billet somewhere in the rhino's thick hide, for to my surprise and relief he had wheeled round sharply, and set off at a clumsy gallop across the plain at right angles to his former direction.

The whole party followed in hot pursuit, even the Irish terrier puppy which accompanied us on all out expeditions rushed as hard as he could, tumbling head over heels upon the tussocks of coarse grass, and emitting shrill yaps of defiance.

We could not get near enough to get another shot at the rhino; it was amazing that such a great unwieldy brute could travel at the pace he did, far quicker than a horse's gallop. Finally we had to give up the chase, much to our disappointment, for my sister and I had been longing for a rhinoceros horn to take home as a trophy ever since we started on our month's trip up country.

Shot by the Kaiser.

From Baily's Magazine.

According to German papers the German Emperor has since he first commenced to shoot killed to his own weapons 33,637 pheasants, 17,963 hares, 3,392 wild boars, 2,447 rabbits, 1,880 red deer stags and 90 hinds, 1,768 fallow bucks and 98 does, 931 roebuck, 826 cormorants and herons, 439 foxes, 121 chamois, 108 capercailzie, 95 grouse, 87 ducks, 24 blackcock, 12 elk, 6 bison, 6 badgers, 4 woodcock, 3 bears, 3 wild turkeys, 3 reindeers, 2 guinea fowl, 2 snipe, 1 whale, 1 pike, 1 martin and 516 various.

Fisherman's Profits.

From the Boston Record.

Some persons claim that there is no money made in the fish industry. Capt. Morris Lubee of the fishing schooner George H. Lubee and the crew of that craft beg to differ. In ten days the crew of this schooner made $2,500.

Four trips were made three to T wharf, and one to Portland, Me. After the members of the crew, fourteen in number, had given their share toward the ship's stores each had $85 left. During the ten days engaged in fishing the men made $8.50 a day.

PROPER ROADS FOR MOTORING

SEARCH TO FIND THE RECIPE CONTINUES.

Recommendations as to Surfacing and Binding Under Certain Conditions Made by Director of U. S. Office of Public Roads—Types of Binders.

The question of proper roads for automobiles interests progressively a greater number of persons each year, because the motorists are a growing group. Many owners of automobiles believe there must be eventually roads exclusively for motor cars with the horde relegated to the side paths. The motor has been responsible for disintegration in roads and the search for the proper surface for motor ways continues steadily.

Information on construction is contained in a paper on "The Construction of Automobile Roads" read before the Society of Automobile Engineers by Logan Waller Page, Director of the United States Office of Public Roads. Mr. Page's paper was:

"Before discussing the construction of automobile roads it may not be amiss to briefly consider the action of automobile traffic on roads as compared with horse drawn traffic. Under horse drawn traffic a well constructed macadam road wears out in two ways: (1) by actual wear of the road material due to impact and abrasion of iron shoes and iron tired wheels, and (2) by disintegration of the road surface apart from the wear of the road material.

The first form of wear actually reduces the second by constantly forming new binding material to replace that which is removed. Where a suitable road stone is employed this replacement keeps abreast with the removal of the products of wear and the road wears out slowly and uniformly. The cost of maintenance is therefore kept within economical limits. On macadam road, and in fact on any style of road, the rubber tired automobile causes but little wear of the material of which the road is constructed.

Unless, however, the individual fragments or units of which the road is composed are firmly held in place, the powerful shearing action of the driving wheels displaces these fragments and so causes rapid disintegration of the road surface. This action increases with the speed and weight of the vehicle, and is most pronounced on curves owing to skidding of the machine at such places. The use of chains and other anti-skidding devices increases somewhat the wear of the road material.

In the construction of automobile roads there may be one of three conditions to meet:

1. The road may be subjected to automobile traffic only, in which case excessive speed is often encountered. Speedways and racetracks are examples of such roads.

2. The road may be subjected to moderate automobile traffic and light horse drawn traffic, as in the case of parkways and pleasure drives.

3. The road may be subjected to mixed traffic including automobiles and heavy horse drawn or teaming traffic, as in the case of many of our country and suburban highways.

While each of these conditions can be successfully met by different forms of construction, there are certain fundamental principles which should never be lost sight of in attempting to meet them. For instance, in roads subjected to horse drawn traffic a certain degree of resiliency is highly desirable, while in those subjected to automobile traffic only resiliency is a minor consideration, owing to the cushioning effect of the rubber tires. Therefore an automobile speedway or racetrack may be well constructed of some rigid material such as Portland cement, concrete or brick.

Roads constructed of such materials are particularly well adapted to withstand the shearing action of machines driven at high speed, for the individual parts are held rigidly in place by a powerful chemical set in the case of cement concrete and by a mechanical set in the case of bricks or blocks. If such roads are well constructed and properly banked at curves they should be practically unaffected by automobile traffic, and if well crowned and drained should last indefinitely, provided due precautions are taken to prevent expansion or contraction cracks by placing expansion joints where needed.

Macadam or gravel roads surfaced with a good grade of bituminous binder may give temporary satisfaction for this class of traffic, but it is doubtful if either the bituminous surfaced or bituminous constructed road will eventually proves as economical, owing to the necessity for more frequent treatment or repairs. In this connection it will be of interest to compare the cost of the brick paved track at Indianapolis with other large automobile raccecourses during a period of five or ten years.

The very factors that make cement, concrete, brick and block desirable materials for the construction of strictly automobile roads cause them to be far from ideal materials for the construction of roads subjected to mixed traffic. Brick and cement concrete being nonresilient are hard upon horses and make noisy roads under the impact of iron shod hoofs. Such roads are therefore undesirable for parkways and pleasure drives. Besides this, all types of brick and block pavements are at the present time far too expensive for the average park and pleasure drive.

Surface treated macadam and gravel roads are as a rule well adapted for the class of traffic here encountered, provided a suitable binder is intelligently applied. The roads are as a rule under constant supervision, so that it is possible to make a number of applications of the binder during a season if necessary without exceeding economical limits. The materials used in such treatment may be hygroscopic salts, oil emulsions or more or less fluid bituminous binders, according to specific local conditions which will have to be met.

Hygroscopic salts, oil emulsions and very fluid oils and tars are employed mainly for the purpose of laying dust, but in so doing they protect the road to a great extent from the destructive action of motor vehicles. As long as the finer products of wear are retained upon the road in sufficient quantity to bind the coarse mineral fragments together the automobile can do but little damage. As soon, however, as these materials lose their dust laying effect or are removed from the road the destructive action begins and if not quickly checked will cause rapid disintegration of the road.

For this reason it is necessary that the treatment be made under competent supervision and at just the right time in order to secure economical results.

Hygroscopic salts, such a calcium chloride, are usually applied in solution and serve to intensify the dust laying effect of water. Oil emulsions, while applied by means of water which acts as a carrier, serve as dust layers after the water has evaporated. Certain types are, however, essentially greasy and exhibit no binding value. This may also be true of the light petroleum and tar products, and when such is the case more harm than good may ultimately result from their use, for by surrounding the mineral particles with a film of grease they act as lubricants and gradually break up the already existing bond of the rock dust.

If they are not applied in excessive quantity a season or more may elapse before their injurious effect is noticeable, and then the road will begin to ravel and disintegrate, although more than sufficient fine material may be present to serve as a binder under normal conditions. When this happens little can be done except to build a new road, for it is almost impossible to rebind the lubricated fragments even by the application of a good binding material.

In the surface treatment of roads with oil or tar products it is poor policy to make use of a material even for laying dust which will not also serve as a binder. Non-realization of this fact has undoubtedly been responsible for the failure of many surface treated roads.

Besides the temporary binders or dust palliatives above mentioned good results have been obtained in the treatment of parkways with refined oil and tar products heavy enough to require heating before they can be applied. Such materials, if containing a good binding base, form a mat or carpet over the surface, as they become incorporated with the dressing of stone chips, sand or gravel which is given the road after their application.

This mat takes up a considerable amount of wear and at the same time protects the underlying surface from disintegration. Until the point of saturation of the bitumen for dust has been reached the road will be practically dustless. This method of treatment should prove effective for at least one year to be economical. In some instances the effect is of longer duration, depending largely upon weather conditions and character of traffic which the road receives.

Horse drawn traffic is more destructive to these mats or carpets than automobiles, particularly in rainy weather. If, however, it is confined to light carriages and buggies and the proportion of these vehicles to automobiles is small they do but little permanent damage. In such instances the passage of a large number of automobiles irons out the marks of hoofs and the grooves cut by steel tired wheels almost as fast as they are formed.

Before leaving the subject of surface treatment mention should be made of one other surfacing material which acts as a powerful temporary binder. This material is the concentrated waste liquor obtained from sulphite process wood pulp mills. It is soluble or miscible in all proportions with water and is applied by means of an ordinary sprinkling cart. It is particularly well adapted for use on automobile roads and produces a hard well bound surface providing all excess of dust is removed before it is applied.

The economical construction and maintenance of the type of road which is subjected to mixed automobile and heavy teaming traffic is probably the most difficult and important problem that to-day confronts the road engineer. As previously stated this type covers many of our country and suburban highways. Frequent application of surface binders under most circumstances cannot be considered even if such treatment would prove satisfactory, for the reason that these roads are not under the constant supervision given to park and pleasure drives.

Surface application of the heavier bituminous binders has not proven satisfactory where teaming traffic is heavy owing to the fact that the heavily loaded and comparatively narrow steel tired wheels cut through the bituminous mat in wet weather and soon cause disintegration. The action of iron shod horses' hoofs is also more severe than on pleasure drives owing to the heavier loads which are hauled over the road. For the preservation of existing roads surface treatment may be resorted to, but when the road is sufficiently worn out to require resurfacing or when a new road is to be constructed it is far better policy to incorporate a binder in the road during construction or reconstruction.

Brick and block pavements are as a rule too expensive for this kind of road, and the non-resilient types are undesirable for reasons before mentioned. Where excessively heavy teaming traffic is encountered the inconvenience of the noisy brick and cement pavements may be more than offset by their lasting quality under ordinary conditions, but the bituminous constructed macadam road will be found most satisfactory.

In the construction of bituminous macadam roads it is seldom necessary to incorporate the binder with more than the upper two or three inches of stone constituting what is known as the wearing course. This is usually done in one of two ways, known as the penetration method and the mixing method.

The penetration method seems to be the more popular to-day, although good results are not as assured as in the mixing method. For both it is of course absolutely essential that a good grade of bituminous binder be used, and failure to obtain such a binder has undoubtedly been the cause of many unsatisfactory experiments along this line. For the penetration method semi-solid petroleum, asphalt and tar products or viscous fluid cutback preparations may be employed, and certain modifications of the general method will often be required to meet the character and consistency of the binder.

For a road six or eight inches thick the foundation is prepared in exactly the same way, irrespective of the method which is later to be employed. All but the upper two or three inches is built as in ordinary macadam construction, with the exception that the voids are somewhat more carefully filled with fine stone screenings. This course may or may not be puddled with water, according to circumstances, but in any event no surplus of screenings should remain on the surface to interfere with a proper interlocking of the foundation and wearing course.

In the penetration method a wearing course of broken stone ranging in size from one-half inch to about one and one-quarter inch is laid upon the prepared foundation to a depth of approximately three inches and rolled until the stones interlock. The bitumen, heated to a considerable degree of fluidity, is then poured or sprinkled over the surface at the rate of from one to one and one-half gallons per square yard. This should penetrate the wearing course and completely cover it for a depth of at least two inches.

Clean stone chips are next applied in sufficient quantity to fill the surface voids and prevent the binder from sticking to the roller wheels, and the road is then well rolled. A seal or flush coat of hot bitumen is painted on the surface at the rate of from .3 to .5 gallon per square yard, after which sufficient stone screenings are applied to take up all excess of bitumen.

In the mixing method the wearing course, which is usually laid to a finished depth of two or two and one-half inches, is composed of a more or less carefully graded mineral aggregate which has been preciously mixed or coated with a hot bituminous binder. After being rolled this course is painted with bitumen and finished off in the same manner as described under the penetration method. Natural bituminous coated aggregates, such as rock asphalt, can sometimes be employed to advantage and certain ready mixed patented aggregates can now be purchased and laid cold.

One other type of automobile road which is now being studied under my supervision and which has so far given some promise of success is Portland cement concrete, to which has been added during the mixing process from ten to fifteen per cent. of residual petroleum upon the basis of cement used. This road, when painted with a coat of bitumen and covered with a thin layer of sand or stone screenings, seems to possess a number of advantages lacking in the straight cement concrete roadway.

In conclusion the subject of automobile roads may be briefly summarized as follows:

Indications point to the following facts:

1. That for automobile racetracks and speedways, a hard non-resilient type of roadway, such as cement concrete and brick is most desirable.

2. For parkways and pleasure drives surface treated macadam and gravel roads will prove satisfactory.

3. For heavily travelled country and suburban highways the bituminous constructed macadam gives most promise of economical and satisfactory results.