This difference is well within the accuracy with which $L_p$ has been measured.

(b) The air-solubility effect.—From the solubilities of $O_2$ and $N_2$ in water at 16° and 30°, the Second Law enables us to compute $\bar{L}_O$ and $\bar{L}_N$, giving

$$L_O = 3360 \text{ cal. mole}^{-1} \quad (25)$$

$$L_N = 3040 \text{ cal. mole}^{-1} \quad (26)$$

and from the determinations of Winther at 30° we obtain

$$S_O = 4.23 \times 10^{-6} \text{ moles per mole} \quad (27)$$

$$S_N = 8.34 \times 10^{-6} \text{ moles per mole} \quad (28)$$

and hence

$$L_O S_O + L_N S_N = 0.040 \text{ cal.} \quad (29)$$

$$L_S - L_P = 0.040 \text{ cal. mole}^{-1} \quad (30)$$

and

$$L_S - L_p = 0.024 \text{ cal. mole}^{-1} \quad (31)$$

The difference between $L_S$ and $L_p$ is thus also well within the experimental accuracy with which either of these quantities has been measured up to the present.

(8) DENSITY OF LIQUIDS

Owing to the slight compressibility of liquids it is customary to ignore barometric influences in making density determinations, and this is indeed justifiable except in determinations where the fifth or sixth decimal is significant. The following table illustrates the order of magnitude of the direct pressure effect for two liquids.

TABLE VI

Density at Room Temperatures

| | at Boston $B = 770$ | at Santa Fé $B = 580$ | Per cent. Difference |
|---|---|---|---|
| Water | 0.998230 | 0.998217 | 0.0013 |
| Ether | 0.713500 | 0.713464 | 0.005 |

The effect of dissolved air upon the density of a liquid can not be computed. It has, however, been determined in the case of water, and its maximum total effect is only 3 units in the sixth decimal place.

It may seem superfluous to point out that all density determinations reported by investigators should be based upon weights *in-vacuo* but it is unfortunately true that many such data recorded in the literature have apparently not been reduced to the *in-vacuo* basis, since information on this point is frequently entirely lacking in the paper.

(9) OTHER PHYSICAL PROPERTIES

Information is lacking concerning the magnitude of the effect of the atmosphere upon the measurement of most physical properties of solids and liquids, since it can usually be discovered only by direct investigation. The inference is that it is probably negligible in most instances. The following additional illustrations of the "direct pressure effect" may, however, be deduced from available information.

VISCOSITY OF ETHYL ETHER

| at Boston $B = 770$ | at Santa Fé $B = 580$ | Per Cent. Difference |
|---|---|---|
| 0.0023400 | 0.0023381 | 0.08 |

SOLUBILITY

| | | |
|---|---|---|
| *m* — Dinitrobenzene in ethyl acetate. | | |
| 34.432 | 34.435 | 0.01 |
| $Ba(OH)_2.8H_2O$ in $H_2O$. | | |
| 8.3000 | 8.2984 | 0.02 |

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## THE TOLL OF THE AUTOMOBILE

WE hear and read a good deal of the enormous annual toll of human life due to the mania for speed so generally prevalent among automobile drivers. On this account our city streets and country highways are dangerous places for pedestrians as well as for other and more discreet motorists. Even the widely heralded "dirt roads" of Iowa are tainted with human blood. "As a killer of men, the automobile is more deadly than typhoid fever and runs a close second to influenza. . . . Up to August of this year (1924) 9,500 lives were sacrificed, chiefly in preventable accidents." Thus reads a recent account in one of our popular magazines.

Not only is the mortality among human beings high, but the death-dealing qualities of the motor car are making serious inroads on our native mammals, birds and other forms of animal life.

This matter was most forcefully brought to my attention during June and July, 1924, when my wife and I made the journey overland from Iowa City, Iowa, to the Iowa Lakeside Laboratory, on West Lake Okoboji, Iowa, a distance of 316 miles. Parts of two days were occupied in the going journey on June 13 and 14, while approximately the same time was required for the return trip on July 15 and 16.

Within a few minutes after we had started from Iowa City and a considerable number of dead animals, apparently casualties from passing motor cars, had been encountered in the road, it occurred to us that an enumeration and actual count of those that we might yet come upon during the remainder of the tour would be of interest. Accordingly, we undertook to do this on both the going and return trip which, although not over the same routes in their entirety, were of exactly the same length.

In this count only freshly killed carcasses of vertebrate animals lying in or immediately at the side of the highway were taken into consideration, and only those forms of whose identity we were certain as we passed along were included. Since we seldom exceeded 25 miles per hour we had ample time to identify the more familiar things. Stops were made for a few of the less common and unusual finds.

Our route took us through typical Iowa farming communities, for the most part moderately thickly populated and supplied with the usual farm buildings. Prairie, marsh and woodland were also represented as were various types of soil and vegetation supported by them. All these conditions make for a diversity of animal life, and we found it well represented on the highways.

About 200 miles of the road were graveled; the remainder was just "plain dirt," most of which had been brought to grade. Of course the surfaced roads permit of greater speed, together with more comfort to the speeder and correspondingly greater danger to human and other lives.

In general, the greatest number of casualties were encountered on the good stretches of road. By way of illustrating this point it may be noted that on the return journey between the Laboratory and Marshalltown, Iowa, a distance of 211 miles, all well graveled, 105 dead animals representing 15 species were counted; of these, 39 were red-headed woodpeckers (*Melanerpes erythrocephalus*). Several other forms that could not be identified in passing were met with.

As will be seen from the appended table the mortality among red-headed woodpeckers is higher than that of any other form observed, and I believe that a combination of circumstances will account for this situation. In the first place, these birds have a propensity for feeding upon insects and waste grain in and along the roads; second, they remain as long as possible before the approaching car, in all probability not being keen discriminators of its speed; and third, they have a slow "get-away," that is, they can not quickly acquire a sufficient velocity to escape the oncoming car and so meet their death. However, I feel certain that a speed of from 35 to 40 miles an hour is necessary in order to catch these birds. Of course this is not true for some other forms such as turtles and snakes which depend upon terrestrial progression and are comparatively slow movers. In most cases all animals, if given a reasonable time to escape, will cause the hurried motorist little if any delay.

Further comment need not be made upon the various factors entering into the situation here discussed. It will be sufficient to point out that on a summer motor trip of 632 miles over Iowa roads, 29 species of our native and introduced vertebrate animals, representing a total of 225 individuals, were found dead as a result of being crushed by passing automobiles, and that this agency demands recognition as one of the important checks upon the natural increase of many forms of life. Assuming that these conditions prevail over the thousands of miles of improved highways in this state and throughout the United States the death toll of the motor car becomes still more appalling.

The details of our findings are herewith recorded in tabular form:

| | June 13–14 | July 15–16 |
|---|---|---|
| **REPTILES** | | |
| 1. Snapping turtle (*Chelydra serpentina*) | — | 3 |
| 2. Painted terrapin (*Chrysemys* sp.) | 1 | 6 |
| 3. Blue racer (*Zamenis constrictor*) | 1 | — |
| 4. Garter snake (*Eutaenia* sp.) | 14 | — |
| 5. Bull snake (*Pituophis* sp.) | 3 | 1 |
| 6. Other snakes (may include some of the above) | 1 | 10 |
| **BIRDS** | | |
| 7. Fowl (*Gallus domesticus*) | 6 | 20 |
| 8. Mourning dove (*Zenaidura macroura carolinensis*) | 2 | 1 |
| 9. Yellow-billed cuckoo (*Coccyzus a. americanus*) | — | 1 |
| 10. Hairy woodpecker (*Dryobates v. villosus*) | — | 1 |
| 11. Red-headed woodpecker (*Melanerpes erythrocephalus*) | 10 | 43 |
| 12. Red-bellied woodpecker (*Centurus carolinus*) | 2 | — |
| 13. Northern flicker (*Colaptes auratus luteus*) | 5 | 14 |
| 14. Meadowlark (*Sturnella* sp.) | 1 | — |
| 15. Bronzed grackle (*Quiscalus quiscala aeneus*) | 4 | 1 |
| 16. English sparrow (*Passer domesticus*) | 5 | 15 |
| 17. Shrike (Migrant?) (*Lanius ludovicianus* (*migrans*?)) | 1 | — |
| 18. Catbird (*Dumetella carolinensis*) | — | 1 |
| 19. Brown thrasher (*Toxostoma rufum*) | — | 5 |
| 20. Robin (*Planesticus m. migratorius*) | 1 | 3 |
| **MAMMALS** | | |
| 21. Western fox squirrel (*Sciurus niger rufiventer*) | — | 2 |
| 22. Thirteen-lined spermophile (*Citellus t. tridecemlineatus*) | 13 | 5 |
| 23. Franklin's spermophile (*Citellus franklini*) | 3 | — |
| 24. Woodchuck (*Marmota m. monax*) | — | 1 |
| 25. Norway rat (*Rattus norvegicus*) | — | 1 |
| 26. Cottontail rabbit (*Sylvilagus* sp.) | 8 | 4 |
| 27. Skunk (*Mephitis putorius*) | 1 | — |
| 28. Weasel (*Putorius longicaudus*) | 2 | — |
| 29. Cat (*Felis domesticus*) | — | 3 |
| Total | 84 | 141 |

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