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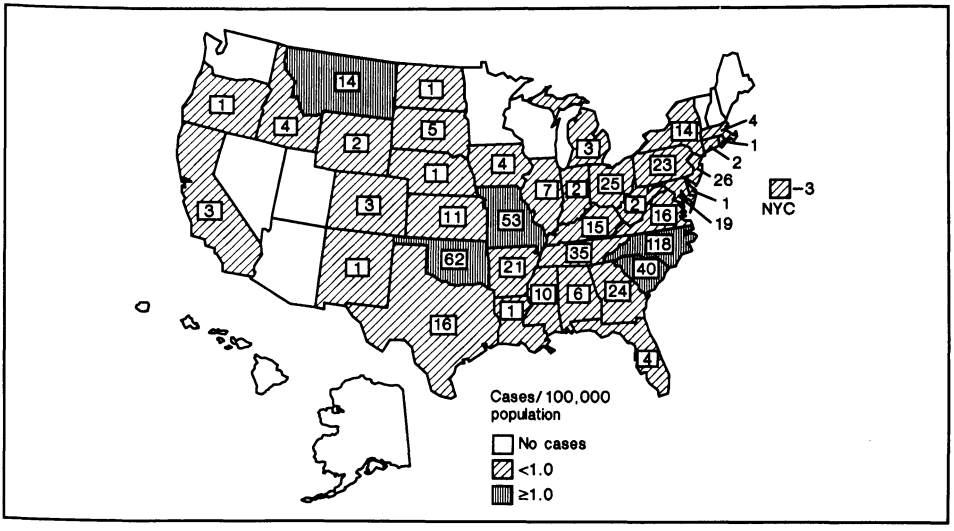
Current Trends

Rocky Mountain Spotted Fever and Human Ehrlichiosis – United States, 1989

Rocky Mountain Spotted Fever

In 1989, state health departments reported 603 cases of Rocky Mountain spotted fever (RMSF) to CDC, a 2.0% decrease from the 615 cases reported in 1988. The incidence rate was 0.25 per 100,000 persons. Of the 603 cases, 224 (37.1%) were reported from the South Atlantic region and 100 (16.6%) from the West South Central region. Oklahoma had the highest rate (62 cases, 1.9 per 100,000); other states with high rates were North Carolina (118 cases, 1.8 per 100,000), Montana (14 cases, 1.8 per 100,000), South Carolina (40 cases, 1.1 per 100,000), and Missouri (53 cases, 1.0 per 100,000) (Figure 1).

FIGURE 1. Reported cases and rates of Rocky Mountain spotted fever, by state – United States, 1989



RMSF and Human Ehrlichiosis — Continued

Detailed case reports were submitted on 487 (80.8%) cases. Of these, 300 (61.6%) were laboratory-confirmed,* 15 (3.1%) were classified as probable,† and 172 (35.3%) were not confirmed. Of the 487 cases, males accounted for 63.1% of cases. For 78.3% of cases, onset of symptoms occurred between May 1 and August 31 (with 46.8% of cases occurring in May and June); for 58.3%, a tick exposure within 14 days of symptoms was reported. Predominant manifestations included fever (90.4% of cases), headache (88.7%), myalgia (82.8%), rash (77.9%), and rash on palms (50.0%). The triad of fever, headache, and rash was present in 49.1% of cases. Age-specific incidence rates were highest in children aged 5–9 years (0.35 per 100,000) and lowest in persons aged 20–29 years (0.15 per 100,000) (Figure 2). The overall case-fatality rate was 1.2%. For persons ≥20 years of age, the case-fatality rate was 1.5%; for persons <20 years of age, the rate was 0.6%.

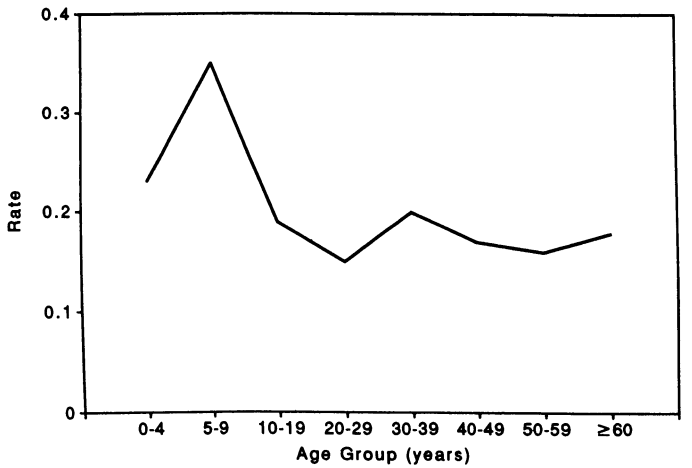
Although the total number of RMSF cases reported in 1989 decreased slightly from 1988, large increases in the number of cases occurred in two Mid-Atlantic states: New Jersey (from none in 1988 to 26 cases in 1989) and Pennsylvania (from two cases to 23 cases). A large decrease occurred in Kansas (26 cases in 1988 to 11 cases in 1989). The reasons for these fluctuations are unknown.

Human Ehrlichiosis

Ehrlichia is a genus in the family *Rickettsiaceae*; members of the genus are characterized by their parasitism of white blood cells. In 1986, human illness (ehrlichiosis) caused by an *Ehrlichia* (*E. canis* or a closely related species) was first recognized in the United States. Like RMSF, the disease appears to be transmitted by ticks and presents as an acute febrile illness (fever often exceeds 39 C [102.2 F]). Other common symptoms of ehrlichiosis and RMSF include myalgia, headache, and nausea

*A case is considered serologically confirmed if testing reveals an indirect fluorescent antibody (IFA) titer of ≥1:64, a complement-fixation (CF) titer of ≥1:16, or a fourfold rise in titer by the CF, IFA, microagglutination (MA), latex agglutination (LA), or indirect hemagglutination (IHA) tests.
†A case is considered probable if testing reveals a fourfold rise in titer or a single titer ≥1:320 in the Weil-Felix test or an IFA, LA, or MA single titer of ≥1:128.

FIGURE 2. Rocky Mountain spotted fever age-specific incidence rates per 100,000 population — United States, 1989



RMSF and Human Ehrlichiosis — Continued

and other gastrointestinal symptoms. Unlike RMSF, however, rash is usually fleeting and occurs in approximately one third of ehrlichiosis cases. About half of the patients have mild leukopenia, thrombocytopenia, and elevation of the alanine aminotransferase and aspartate aminotransferase.

Although no formal surveillance system exists for human ehrlichiosis, in 1989, 38 cases were detected by informal laboratory-based surveillance.[§] Ten states had confirmed cases of human ehrlichiosis: Missouri (14 cases), Virginia (10), Oklahoma (four), Georgia (two), Tennessee (two), Washington (two), Arkansas (one), Illinois (one), Louisiana (one), and Texas (one). No fatal cases of human ehrlichiosis were reported for 1989.

Reported by: State health departments. Viral and Rickettsial Zoonoses Br, Div of Viral and Rickettsial Diseases, Center for Infectious Diseases, CDC.

Editorial Note: During the 1980s, reported cases of RMSF declined from a high of 1170 cases in 1981 (*1*) to 592 cases in 1987 (*2*); small fluctuations in the number of cases have occurred since then. North Carolina led the nation in reported number of cases each year during the decade (mean: 179 per year), but Oklahoma had the highest incidence rate during 7 of the 10 years (mean: 3.1 per 100,000). Cases reported in males during the 1980s consistently exceeded those in females by a 3:2 ratio. The case-fatality rate was highest in 1982 (4.7%) (*3*) and lowest in 1989 (1.1%).

Because no laboratory test is consistently positive during the first 2 weeks of illness, patients with suspected RMSF should be treated empirically and serologic tests delayed until both acute and convalescent serum specimens are available. The indirect fluorescent antibody (IFA) and the indirect hemagglutination (IHA) tests are the most sensitive and specific of these tests (*4,5*). Complement-fixation, latex agglutination, and microagglutination are specific but lack the sensitivity of the IFA and IHA tests; negative results in one of these tests does not exclude the diagnosis of RMSF (*4,5*). The Weil-Felix test should not be used because it lacks both sensitivity and specificity. When paired serum specimens are not available, single specimens can be tested, but results may not be positive during the first 2 weeks of illness.

When diagnosis is considered essential to proper case management during the first 2 weeks of illness, a number of rapid diagnostic tests can be considered. Most untreated RMSF patients have rickettsemia; however, to determine the presence of rickettsiae, testing should be performed in only a few reference laboratories since laboratory-acquired infections have been reported (*6*). If a rash is present, a definitive diagnosis can sometimes be made by detecting *Rickettsia rickettsii* antigen in skin lesions, using a direct fluorescent antibody technique (*7*). However, the availability of this test is limited, and its sensitivity is only about 50%–70%. Recently, polymerase chain reaction technology was applied to the detection of *R. rickettsii* in the blood of a group of patients during the acute phase of infection (*8*).

Although substantially fewer cases of human ehrlichiosis than RMSF are reported, two recent studies indicate that in some geographic areas the incidence of human ehrlichiosis may equal or exceed that of RMSF. Of 249 paired serum samples submitted to the Oklahoma State Department of Health for RMSF testing in 1987, 29 (11.6%) were positive for antibody to *E. canis* and 29 (11.6%) were positive for *R. rickettsii* (*9*). Hospital-based active surveillance for human ehrlichiosis in southeast Georgia

[§]A case is considered serologically confirmed if testing reveals a fourfold rise or fall in antibody titer, with a titer of at least 1:64, in an IFA to *E. canis*.

RMSF and Human Ehrlichiosis — Continued

for an 18-month period in 1987 and 1988 detected eight cases, an annual rate of 5.3 per 100,000; during the same period, one case of RMSF was detected in this area (*10*).

Because no vaccine exists for RMSF, the best preventive measure is avoidance of tick-infested areas. Persons who must enter these areas should wear protective clothing. Attached ticks should be removed by grasping them with fine tweezers at the point of attachment and pulling gently (*11*). When fingers are used instead of tweezers, they should be protected with facial tissue and washed afterwards.

The polymerase chain reaction diagnostic test for RMSF and serologic tests for human ehrlichiosis are available for selected patients following consultation with state health departments or CDC's Viral and Rickettsial Zoonoses Branch, Division of Viral and Rickettsial Diseases, Center for Infectious Diseases (telephone [404] 639-1075). RMSF cases should be reported to state health departments.

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Plasmid-Mediated Antimicrobial Resistance in *Neisseria gonorrhoeae* — United States, 1988 and 1989

Because the prevalence of antimicrobial resistance in *Neisseria gonorrhoeae* increased during the early 1980s (*1*), in 1986 CDC implemented the Gonococcal Isolate Surveillance Project (GISP) to monitor antimicrobial susceptibilities at 21 collaborating sexually transmitted disease clinics in 21 cities (Figure 1) (*2*). Each month, isolates from the first 20 men* with urethral gonococcal infections at each clinic are submitted to one of four regional laboratories for susceptibility testing. This report describes the results of surveillance for plasmid-mediated resistance in *N. gonorrhoeae* in 1988 and 1989.

During these 2 years, 9309 gonococcal isolates (4620 in 1988 and 4689 in 1989) were collected from the 21 clinics. Strains were isolated primarily from black (76.6%), heterosexual (95.9%) men; the median age of the men was 25 years.

*Isolates were collected from the first 25 men; isolates 21–25 were used to replace missing isolates in the sequence 1–20.

Neisseria gonorrhoeae — *Continued*

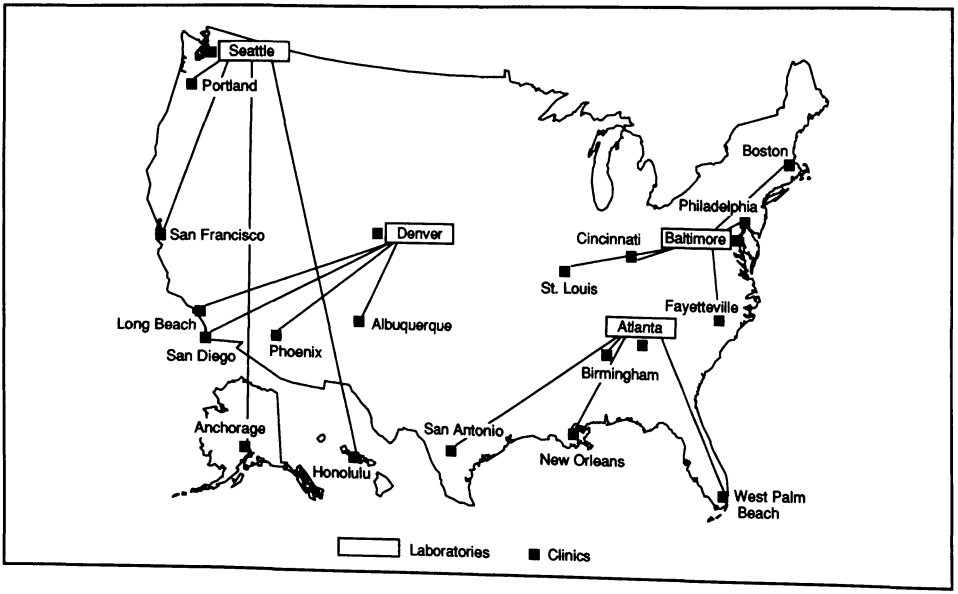
The susceptibilities (minimum inhibitory concentrations [MICs]) to penicillin, tetracycline, spectinomycin, and ceftriaxone were determined for each isolate. The definitions of susceptibility to these antimicrobial agents are those of the National Committee for Clinical Laboratory Standards and CDC (*3*). Penicillinase-producing *N. gonorrhoeae* (PPNG) was identified with a β-lactamase test. An MIC of ≥16.0 μg tetracycline/mL identified presumptively an isolate as having plasmid-mediated, high-level resistance to tetracycline (tetracycline-resistant *N. gonorrhoeae* [TRNG]). Isolates that produced β-lactamase and had an MIC of ≥16.0 μg tetracycline/mL were classified as PPNG/TRNG. Plasmid-mediated resistance to ceftriaxone or spectinomycin has not been observed in *N. gonorrhoeae*.

PPNG. In 1988, PPNG accounted for 149 (3.2%) isolates (range: 0.0%–10.4%; median: 3.0%), and in 1989, 346 (7.4%) isolates (range: 1.2%–31.7%; median: 5.0%) (Table 1). From 1988 to 1989, statistically significant increases ($p<0.05$) in the percentage of PPNG occurred in seven clinics (Atlanta, Birmingham, Boston, Long Beach, Philadelphia, San Antonio, and San Diego). PPNG rates remained approximately the same in the other 14 clinics.

TRNG. In 1988, TRNG accounted for 184 (4.0%) isolates (range: 0.0%–32.0%; median: 0.8%), and in 1989, 229 (4.9%) isolates (range: 0.0%–19.8%; median: 1.7%). In both years, the percentage of infections with TRNG was highest among clinics in the east and southeast (Table 2). From 1988 to 1989, statistically significant increases ($p<0.05$) in the percentage of TRNG were observed in four clinics (Birmingham, Denver, St. Louis, and West Palm Beach); significantly fewer ($p<0.05$) TRNG were isolated from patients in Atlanta and Baltimore.

PPNG/TRNG. PPNG/TRNG accounted for 15 (0.3%) and 41 (0.9%) isolates in 1988 and 1989, respectively. PPNG/TRNG strains were isolated most frequently from patients in Philadelphia, where they accounted for 4.2% of all isolates in 1988 and

FIGURE 1. Location of clinics and regional laboratories in the CDC Gonococcal Isolate Surveillance Project — United States, 1990



Neisseria gonorrhoeae — *Continued*

9.7% of all isolates in 1989. PPNG/TRNG strains were isolated from one patient at each of five other clinics in 1988 (Albuquerque; Boston; Fayetteville, North Carolina; San Antonio; and San Francisco) and from 18 patients at six other clinics in 1989 (Baltimore, Boston, Denver, Fayetteville, San Antonio, and San Francisco).

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Editorial Note: Although national gonorrhea rates changed little from 1988 (302 per 100,000 persons) to 1989 (298 per 100,000), important increases occurred in the percentage of isolates with plasmid-mediated resistance. PPNG was first isolated in the United States in 1976. From 1976 through 1981, the prevalence of PPNG infections increased slowly; foci of infections were identified in Los Angeles, Miami, and New York City. From 1981 through 1986, the prevalence of PPNG infections increased more than fivefold (*1*). This increasing prevalence prompted the recommendation that

TABLE 1. Comparative percentages of penicillinase-producing *Neisseria gonorrhoeae* (PPNG) — 21 selected public clinics, 1988 and 1989

	1988			1989		
		PPNG			PPNG	
Clinic	Total isolates	No.	(%)	Total isolates	No.	(%)
Albuquerque, New Mexico	174	2	(1.1)	172	2	(1.2)
Anchorage, Alaska	132	4	(3.0)	171	13	(7.6)
Atlanta, Georgia	236	7	(3.0)	240	43	(17.9)*
Baltimore, Maryland	239	8	(3.4)	240	11	(4.6)
Birmingham, Alabama	216	9	(4.2)	239	26	(10.9)*
Boston, Massachusetts	238	6	(2.5)	239	36	(15.1)*
Cincinnati, Ohio	236	0	—	240	5	(2.1)*
Denver, Colorado	240	5	(2.1)	240	9	(3.8)
Fayetteville, North Carolina	216	14	(6.5)	217	13	(6.0)
Honolulu, Hawaii	122	10	(8.2)	126	11	(8.7)
Long Beach, California	230	24	(10.4)	240	76	(31.7)*
New Orleans, Louisiana	220	0	—	217	4	(1.8)
Philadelphia, Pennsylvania	238	8	(3.4)	238	21	(8.8)*
Phoenix, Arizona	220	0	—	240	3	(1.3)
Portland, Oregon	235	8	(3.4)	240	12	(5.0)
San Diego, California	239	2	(0.8)	240	22	(9.2)*
Seattle, Washington	235	11	(4.7)	240	8	(3.3)
San Francisco, California	240	4	(1.7)	240	9	(3.8)
St. Louis, Missouri	238	1	(0.4)	212	3	(1.4)
San Antonio, Texas	238	0	—	239	6	(2.5)*
West Palm Beach, Florida	238	26	(10.9)	219	13	(5.9)
Total	**4620**	**149**	**(3.2)**	**4689**	**346**	**(7.4)**

*Statistically significant increase ($p<0.05$).

Neisseria gonorrhoeae — *Continued*

penicillins be virtually abandoned as single-dose, primary therapy for gonorrhea (*4*).

From 1988 through 1989, PPNG was isolated at all clinics participating in GISP; in 15 of the clinics in 1989, the percentage of PPNG infections exceeded the definition for "hyperendemicity" of PPNG (prevalence ≥3.0%) (*4*). Although clinics in Los Angeles, Miami, and New York City are not participating in GISP, the percentage of PPNG infections remains high in those cities (CDC, unpublished data). The percentage of PPNG infections in the clinics participating in GISP indicates that PPNG has spread beyond its initial geographic foci and now represents a public health problem in all regions of the United States.

TRNG was first described in 1986 (*5*). Infections with TRNG appear to be most common in the eastern United States; in 1989, however, of the four clinics reporting substantial increases in the percentage of TRNG, one was in the midwest (St. Louis), and one in the west (Denver). These data suggest that further spread of TRNG from eastern to western cities is likely. In 1985, based on previously described

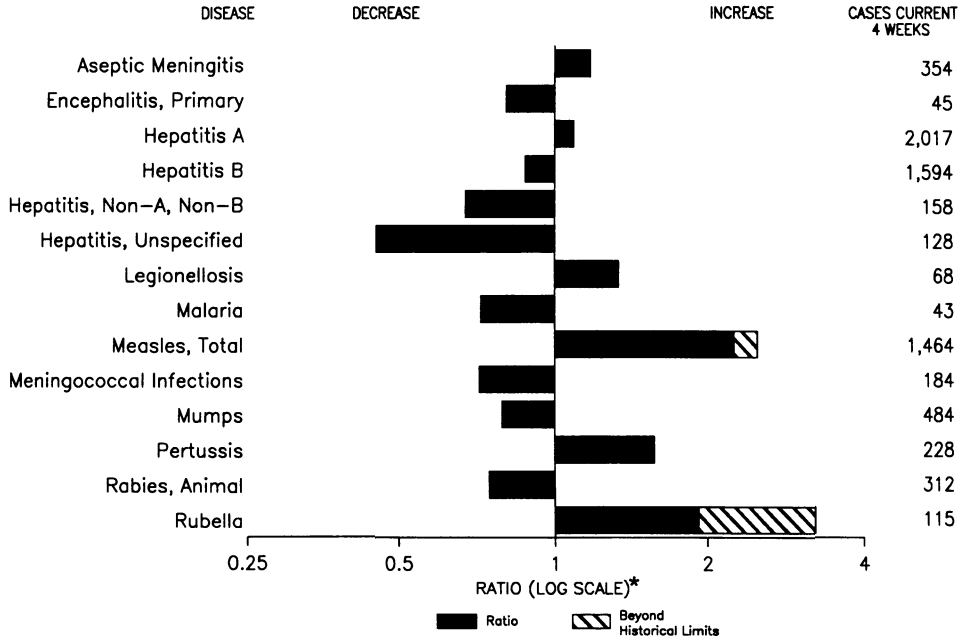
(Continued on page 293)

TABLE 2. Comparative percentages of tetracycline-resistant *Neisseria gonorrhoeae* (TRNG) — 21 selected public clinics, 1988 and 1989

Clinic	1988 Total isolates	1988 TRNG No.	1988 TRNG (%)	1989 Total isolates	1989 TRNG No.	1989 TRNG (%)
Albuquerque, New Mexico	174	1	(0.6)	172	0	—
Anchorage, Alaska	132	1	(0.8)	171	0	—
Atlanta, Georgia	236	10	(4.2)	240	2	(0.8)*
Baltimore, Maryland	239	55	(23.0)	240	20	(8.3)*
Birmingham, Alabama	216	18	(8.3)	239	40	(16.7)†
Boston, Massachusetts	238	7	(2.9)	239	6	(2.5)
Cincinnati, Ohio	236	2	(0.9)	240	1	(0.4)
Denver, Colorado	240	2	(0.8)	240	12	(5.0)†
Fayetteville, North Carolina	216	13	(6.0)	217	14	(6.5)
Honolulu, Hawaii	122	1	(0.8)	126	1	(0.8)
Long Beach, California	230	1	(0.4)	240	0	—
New Orleans, Louisiana	220	21	(9.6)	217	32	(14.8)
Philadelphia, Pennsylvania	238	35	(14.7)	238	47	(19.8)
Phoenix, Arizona	220	3	(1.4)	240	4	(1.7)
Portland, Oregon	235	0	—	240	0	—
San Diego, California	239	2	(0.8)	240	8	(3.3)
Seattle, Washington	235	1	(0.4)	240	4	(1.7)
San Francisco, California	240	6	(2.5)	240	3	(1.3)
St. Louis, Missouri	238	4	(1.7)	212	25	(11.8)†
San Antonio, Texas	238	1	(0.4)	239	3	(1.3)
West Palm Beach, Florida	238	0	—	219	7	(3.2)†
Total	**4620**	**184**	**(4.0)**	**4689**	**229**	**(4.9)**

*Statistically significant decrease ($p<0.05$).
†Statistically significant increase ($p<0.05$).

FIGURE I. Notifiable disease reports, comparison of 4-week totals ending April 28, 1990, with historical data — United States



*Ratio of current 4-week total to mean of 15 4-week totals (from comparable, previous, and subsequent 4-week periods for past 5 years).

TABLE I. Summary — cases of specified notifiable diseases, United States, cumulative, week ending April 28, 1990 (17th Week)

	Cum. 1990		Cum. 1990
AIDS	14,500	Plague	-
Anthrax	-	Poliomyelitis, Paralytic*	-
Botulism: Foodborne	1	Psittacosis	49
Infant	14	Rabies, human	-
Other	2	Syphilis: civilian	15,716
Brucellosis	10	military	95
Cholera	1	Syphilis, congenital, age < 1 year	-
Congenital rubella syndrome	1	Tetanus	17
Diphtheria	2	Toxic shock syndrome	119
Encephalitis, post-infectious	32	Trichinosis	12
Gonorrhea: civilian	215,011	Tuberculosis	6,358
military	3,037	Tularemia	13
Leprosy	52	Typhoid fever	118
Leptospirosis	12	Typhus fever, tickborne (RMSF)	35
Measles: imported	493		
indigenous	5,371		

*One case of suspected poliomyelitis has been reported in 1990; none of the 13 suspected cases in 1989 have been confirmed to date. Nine of 14 suspected cases in 1988 were confirmed and all were vaccine-associated.

TABLE II. Cases of specified notifiable diseases, United States, weeks ending April 28, 1990, and April 29, 1989 (17th Week)

Reporting Area	AIDS	Aseptic Menin-gitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionel-losis	Leprosy
			Primary	Post-in-fectious			A	B	NA,NB	Unspeci-fied		
	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1989	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990
UNITED STATES	14,500	1,436	208	32	215,011	216,088	9,471	6,722	640	581	359	52
NEW ENGLAND	534	68	6	-	6,175	6,103	206	357	19	28	14	-
Maine	21	2	1	-	83	87	3	17	3	1	1	-
N.H.	35	6	-	-	58	64	4	20	1	2	2	-
Vt.	7	8	-	-	24	24	2	20	2	-	3	-
Mass.	293	21	1	-	2,377	2,439	152	228	8	24	5	-
R.I.	25	19	-	-	322	484	22	20	-	1	3	-
Conn.	153	12	4	-	3,311	3,005	23	52	5	-	-	-
MID. ATLANTIC	4,827	200	13	1	29,350	36,029	1,453	1,120	73	42	88	11
Upstate N.Y.	776	83	12	-	4,305	5,223	324	231	13	14	36	1
N.Y. City	2,776	41	1	-	12,336	15,586	174	383	12	15	9	7
N.J.	879	-	-	-	4,565	4,563	160	244	22	-	9	2
Pa.	396	76	-	1	8,144	10,657	795	262	26	13	34	1
E.N. CENTRAL	862	218	48	6	42,429	36,919	651	879	32	46	99	-
Ohio	198	63	12	2	13,023	9,853	80	174	10	6	38	-
Ind.	93	32	2	2	3,609	2,403	76	212	3	17	19	-
Ill.	372	38	16	2	13,292	10,969	247	118	8	10	4	-
Mich.	155	76	16	-	10,266	10,429	154	236	9	13	26	-
Wis.	44	9	2	-	2,239	3,265	94	139	2	-	12	-
W.N. CENTRAL	325	61	16	1	11,690	9,196	515	299	34	11	19	-
Minn.	57	6	8	1	1,416	972	83	36	12	-	-	-
Iowa	18	7	1	-	868	830	113	29	1	2	2	-
Mo.	196	26	1	-	6,893	5,513	201	177	9	7	14	-
N. Dak.	-	2	-	-	24	50	3	4	2	1	-	-
S. Dak.	2	2	2	-	68	90	15	4	1	-	-	-
Nebr.	19	9	3	-	562	499	32	15	2	-	1	-
Kans.	33	9	1	-	1,859	1,242	68	34	7	1	2	-
S. ATLANTIC	3,126	343	54	10	60,354	59,209	1,087	1,233	97	92	55	2
Del.	34	10	1	-	955	973	44	29	2	-	4	-
Md.	360	54	7	-	6,187	6,731	476	166	13	3	16	1
D.C.	201	1	-	-	3,148	3,721	7	12	4	-	-	-
Va.	289	62	21	2	5,851	4,941	84	78	12	75	6	-
W. Va.	24	4	5	-	448	451	9	30	2	-	-	-
N.C.	221	31	14	-	9,862	8,950	215	362	46	-	9	-
S.C.	116	5	-	-	5,163	5,328	15	209	8	6	6	-
Ga.	401	35	3	1	13,517	11,588	85	147	3	5	10	-
Fla.	1,480	141	3	7	15,223	16,526	152	200	7	3	4	1
E.S. CENTRAL	307	114	18	-	17,950	16,901	113	509	41	3	27	-
Ky.	64	34	5	-	1,934	1,632	34	158	15	2	10	-
Tenn.	83	25	9	-	6,000	5,289	45	279	16	-	9	-
Ala.	78	41	4	-	5,757	5,469	33	68	8	-	8	-
Miss.	82	14	-	-	4,259	4,511	1	4	2	1	-	-
W.S. CENTRAL	1,429	92	7	4	20,680	22,735	913	501	64	77	23	14
Ark.	145	4	-	-	2,882	2,335	166	26	3	8	5	-
La.	224	11	3	-	4,257	4,852	44	97	-	2	7	-
Okla.	55	9	1	4	1,980	2,022	202	46	10	8	9	-
Tex.	1,005	68	3	-	11,561	13,526	501	332	51	59	2	14
MOUNTAIN	377	62	6	-	4,180	4,393	1,561	508	47	54	21	-
Mont.	3	1	-	-	53	61	38	31	2	3	-	-
Idaho	14	-	-	-	33	75	28	27	7	-	2	-
Wyo.	1	1	1	-	54	44	21	6	1	-	-	-
Colo.	106	17	1	-	966	991	94	65	13	19	3	-
N. Mex.	32	3	-	-	380	447	205	54	3	-	2	-
Ariz.	139	17	3	-	1,809	1,597	948	162	15	25	8	-
Utah	30	14	-	-	139	152	88	26	4	2	1	-
Nev.	52	9	1	-	746	1,026	139	137	2	5	5	-
PACIFIC	2,713	278	40	10	22,203	24,603	2,972	1,316	233	228	13	25
Wash.	229	-	1	1	1,929	2,102	495	205	46	9	3	1
Oreg.	92	-	-	-	856	889	330	153	12	5	-	-
Calif.	2,330	253	36	8	18,956	21,171	2,050	913	171	210	9	20
Alaska	14	3	2	-	353	283	57	23	3	1	-	-
Hawaii	48	22	1	1	109	158	40	22	1	3	1	4
Guam	1	-	-	-	48	42	2	1	-	4	-	-
P.R.	669	30	4	-	347	347	56	65	-	19	-	-
V.I.	6	-	-	-	160	189	-	5	-	-	-	-
Amer. Samoa	-	-	-	-	24	11	12	-	-	-	-	5
C.N.M.I.	-	-	-	-	52	27	3	1	-	-	-	1

N: Not notifiable U: Unavailable C.N.M.I.: Commonwealth of the Northern Mariana Islands

TABLE II. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending April 28, 1990, and April 29, 1989 (17th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1990	1990	Cum. 1990	1990	Cum. 1990	Cum. 1989	Cum. 1990	1990	Cum. 1990	1990	Cum. 1990	Cum. 1989	1990	Cum. 1990	Cum. 1989
UNITED STATES	293	581	5,371	36	493	3,952	1,003	104	1,911	27	884	612	24	267	107
NEW ENGLAND	34	-	93	-	13	169	61	-	16	11	111	15	-	3	1
Maine	-	-	27	-	-	-	7	-	-	-	4	4	-	-	-
N.H.	3	-	-	-	8	1	2	-	6	-	10	5	-	-	-
Vt.	3	-	-	-	1	1	5	-	1	2	5	2	-	-	1
Mass.	19	-	4	-	1	25	29	-	4	8	83	-	-	-	-
R.I.	3	-	23	-	3	20	4	-	3	-	-	2	-	1	-
Conn.	6	-	39	-	-	122	14	-	2	1	9	2	-	2	-
MID. ATLANTIC	71	22	451	-	123	396	155	6	109	3	257	46	-	2	6
Upstate N.Y.	14	18	155	-	101	86	55	5	55	3	214	23	-	1	2
N.Y. City	26	-	43	-	15	36	17	-	-	-	-	2	-	-	2
N.J.	16	-	8	-	-	246	33	-	19	-	7	17	-	-	2
Pa.	15	4	245	-	7	28	50	1	35	-	36	4	-	1	-
E.N. CENTRAL	15	-	1,813	-	132	732	137	4	207	1	193	89	-	13	12
Ohio	3	-	213	-	2	363	47	-	47	1	54	1	-	-	2
Ind.	-	-	153	-	-	-	13	-	5	-	31	8	-	-	-
Ill.	5	-	746	-	4	355	34	-	61	-	51	30	-	13	9
Mich.	4	-	212	-	125	2	30	4	65	-	32	18	-	-	-
Wis.	3	-	489	-	1	12	13	-	29	-	25	32	-	-	1
W.N. CENTRAL	4	13	166	-	11	326	36	2	63	-	18	19	-	-	3
Minn.	1	-	37	-	3	2	8	-	-	-	-	-	-	-	-
Iowa	-	-	21	-	-	1	1	1	8	-	3	6	-	-	-
Mo.	3	-	39	-	-	265	12	1	35	-	10	11	-	-	2
N. Dak.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S. Dak.	-	5	5	-	7	-	2	-	-	-	1	1	-	-	-
Nebr.	-	-	26	-	1	6	5	-	1	-	1	-	-	-	-
Kans.	-	8	38	-	-	52	8	-	19	-	3	1	-	-	1
S. ATLANTIC	63	27	353	14	53	219	189	41	694	3	74	57	-	11	2
Del.	2	-	4	-	1	17	1	-	-	-	1	-	-	-	-
Md.	15	5	40	-	11	11	19	26	401	-	19	5	-	-	1
D.C.	5	-	2	5§	6	8	4	-	14	-	5	-	-	1	-
Va.	15	4	25	-	2	1	22	1	29	1	8	4	-	-	-
W. Va.	1	-	6	-	-	-	7	-	36	1	8	9	-	-	-
N.C.	5	-	3	-	-	142	30	2	53	-	13	13	-	-	-
S.C.	-	-	1	-	-	-	14	1	15	-	3	-	-	-	-
Ga.	5	4	6	8†§	12	-	38	5	47	-	11	5	-	-	-
Fla.	15	14	266	1†	21	40	54	6	99	1	6	21	-	10	1
E.S. CENTRAL	8	2	44	-	-	4	54	3	42	3	37	32	-	1	1
Ky.	2	-	3	-	-	2	17	-	-	-	-	1	-	-	-
Tenn.	5	1	21	-	-	1	16	-	18	-	12	14	-	1	1
Ala.	1	1	5	-	-	1	19	3	6	3	23	14	-	-	-
Miss.	-	-	15	-	-	-	2	N	N	-	2	3	-	-	-
W.S. CENTRAL	3	146	721	10	48	1,637	69	22	406	2	16	21	-	1	11
Ark.	-	-	-	5§	13	-	6	-	99	-	1	9	-	1	-
La.	-	-	-	-	-	6	16	7	66	-	1	4	-	-	5
Okla.	3	1	123	-	-	7	9	5	93	2	14	8	-	-	1
Tex.	-	145	598	5†	35	1,624	38	10	148	-	-	-	-	-	5
MOUNTAIN	5	34	297	11	51	51	29	9	131	1	80	251	11	22	2
Mont.	-	-	-	-	1	13	6	-	-	-	-	-	8	13	1
Idaho	2	-	14	3†§	5	1	1	4	60	1	10	31	3	6	-
Wyo.	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Colo.	-	1	21	8†§	18	17	10	1	11	-	47	17	-	2	-
N. Mex.	-	2	58	-	13	19	2	N	N	-	4	4	-	-	-
Ariz.	3	22	112	-	11	1	2	4	45	-	10	190	-	-	-
Utah	-	-	-	-	-	-	4	-	3	-	5	8	-	-	-
Nev.	-	9	92	-	3	-	4	-	10	-	4	1	-	1	1
PACIFIC	90	337	1,433	1	62	418	273	17	243	3	98	82	13	214	69
Wash.	6	-	7	-	38	10	29	-	19	-	31	19	-	-	-
Oreg.	4	-	-	-	-	-	32	N	N	-	3	4	-	-	-
Calif.	79	337	1,360	1†	21	399	205	17	220	1	52	57	12	209	53
Alaska	-	-	65	-	2	-	6	-	-	-	-	-	-	-	-
Hawaii	1	-	1	-	1	9	1	-	4	2	12	2	1	5	16
Guam	1	U	-	U	-	1	-	U	-	U	-	1	U	-	-
P.R.	-	226	698	-	-	295	6	-	3	-	4	2	-	-	4
V.I.	-	-	-	-	-	2	-	1	5	-	-	-	-	-	-
Amer. Samoa	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
C.N.M.I.	-	U	-	U	-	-	-	U	4	U	-	-	U	-	-

*For measles only, imported cases includes both out-of-state and international importations.

N: Not notifiable U: Unavailable †International §Out-of-state

TABLE II. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending April 28, 1990, and April 29, 1989 (17th Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1990	Cum. 1989	Cum. 1990	Cum. 1990	Cum. 1989	Cum. 1990	Cum. 1990	Cum. 1990	Cum. 1990
UNITED STATES	15,716	13,383	119	6,358	6,264	13	118	35	1,132
NEW ENGLAND	631	519	10	150	134	-	9	-	1
Maine	5	3	2	-	3	-	-	-	-
N.H.	28	2	1	3	4	-	-	-	1
Vt.	1	-	-	2	2	-	-	-	-
Mass.	228	155	6	73	73	-	8	-	-
R.I.	1	13	-	28	18	-	-	-	-
Conn.	368	346	1	44	34	-	1	-	-
MID. ATLANTIC	3,335	2,770	11	1,566	1,268	1	34	3	276
Upstate N.Y.	229	240	4	24	113	-	8	-	7
N.Y. City	1,592	1,127	4	1,018	729	-	17	-	-
N.J.	521	430	-	288	197	1	8	3	85
Pa.	993	973	3	236	229	-	1	-	184
E.N. CENTRAL	1,102	511	33	666	664	-	18	3	18
Ohio	160	38	15	78	129	-	4	1	2
Ind.	11	19	2	34	57	-	-	-	-
Ill.	423	212	3	337	299	-	10	-	6
Mich.	391	217	13	191	148	-	3	2	-
Wis.	117	25	-	26	31	-	1	-	10
W.N. CENTRAL	130	101	15	168	171	4	-	3	161
Minn.	32	7	-	28	40	-	-	-	73
Iowa	12	13	2	21	25	-	-	-	10
Mo.	64	51	10	79	62	3	-	2	7
N. Dak.	1	1	-	7	6	-	-	-	20
S. Dak.	1	-	-	4	12	-	-	-	31
Nebr.	4	15	2	10	6	1	-	-	1
Kans.	16	14	1	19	20	-	-	1	19
S. ATLANTIC	4,889	4,823	3	1,234	1,308	3	8	9	321
Del.	64	54	-	13	16	-	-	-	4
Md.	400	255	-	110	111	-	4	-	110
D.C.	274	277	-	37	57	-	-	-	-
Va.	263	184	-	104	121	1	-	-	57
W. Va.	6	4	-	22	30	-	-	-	9
N.C.	569	293	2	159	124	1	-	7	2
S.C.	297	251	-	149	132	1	-	2	40
Ga.	1,140	1,020	-	167	184	-	1	-	73
Fla.	1,876	2,485	1	473	533	-	3	-	26
E.S. CENTRAL	1,426	865	5	536	556	1	-	5	50
Ky.	25	19	-	138	135	-	-	-	20
Tenn.	623	370	3	178	148	1	-	5	6
Ala.	409	289	2	153	160	-	-	-	24
Miss.	369	187	-	67	113	-	-	-	-
W.S. CENTRAL	2,539	1,713	6	774	698	3	2	10	156
Ark.	137	110	-	78	83	1	-	1	7
La.	764	396	1	78	72	-	-	-	-
Okla.	68	27	5	70	60	2	-	9	47
Tex.	1,570	1,180	-	548	483	-	2	-	102
MOUNTAIN	289	260	15	138	164	1	7	1	50
Mont.	-	-	-	10	5	-	-	-	16
Idaho	5	-	1	3	4	-	-	-	-
Wyo.	-	-	1	-	-	-	-	-	24
Colo.	16	43	5	6	3	-	-	-	-
N. Mex.	18	11	4	34	27	1	-	1	2
Ariz.	184	70	4	64	77	-	5	-	6
Utah	2	8	-	3	29	-	-	-	-
Nev.	64	128	-	18	19	-	2	-	2
PACIFIC	1,375	1,821	21	1,126	1,301	-	40	1	99
Wash.	100	133	3	96	66	-	1	-	-
Oreg.	40	97	-	39	46	-	-	-	-
Calif.	1,226	1,584	17	936	1,116	-	37	1	84
Alaska	3	2	-	16	21	-	-	-	15
Hawaii	6	5	1	39	52	-	2	-	-
Guam	-	3	-	11	30	-	-	-	-
P.R.	263	168	-	29	78	-	-	-	12
V.I.	1	1	-	2	3	-	-	-	-
Amer. Samoa	-	-	-	3	2	-	-	-	-
C.N.M.I.	-	1	-	10	6	-	4	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending April 28, 1990 (17th Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	637	450	115	43	9	20	56
Boston, Mass.	171	112	32	20	1	6	19
Bridgeport, Conn.	45	28	12	2	1	2	-
Cambridge, Mass.	19	16	3	-	-	-	1
Fall River, Mass.	27	21	4	2	-	-	-
Hartford, Conn.	55	36	8	4	3	4	6
Lowell, Mass.	27	19	6	1	-	1	5
Lynn, Mass.	32	26	5	1	-	-	2
New Bedford, Mass.	19	15	3	1	-	-	2
New Haven, Conn.	52	38	6	5	1	2	4
Providence, R.I.	42	32	7	2	-	1	5
Somerville, Mass.	7	4	3	-	-	-	-
Springfield, Mass.	43	34	6	1	1	1	5
Waterbury, Conn.	26	20	4	2	-	-	2
Worcester, Mass.	72	49	16	2	2	3	5
MID. ATLANTIC	2,675	1,748	561	228	62	76	167
Albany, N.Y.	51	36	10	2	1	2	3
Allentown, Pa.	13	8	4	1	-	-	-
Buffalo, N.Y.	100	66	22	5	4	3	8
Camden, N.J.	35	23	10	-	1	1	-
Elizabeth, N.J.	21	11	5	5	-	-	-
Erie, Pa.†	38	30	6	2	-	-	1
Jersey City, N.J.	70	44	20	2	-	4	2
N.Y. City, N.Y.	1,423	910	290	158	32	33	75
Newark, N.J.	61	26	12	11	5	7	5
Paterson, N.J.	33	20	5	6	-	2	4
Philadelphia, Pa.	390	252	88	22	14	14	34
Pittsburgh, Pa.†	57	34	18	1	-	4	4
Reading, Pa.	26	19	7	-	-	-	5
Rochester, N.Y.	124	97	18	4	3	2	9
Schenectady, N.Y.	25	22	2	1	-	-	-
Scranton, Pa.†	22	16	4	-	1	1	4
Syracuse, N.Y.	83	58	18	4	-	3	3
Trenton, N.J.	47	32	14	-	1	-	3
Utica, N.Y.	16	13	1	2	-	-	2
Yonkers, N.Y.	40	31	7	2	-	-	5
E.N. CENTRAL	2,380	1,580	479	172	60	89	130
Akron, Ohio	63	50	7	2	-	4	-
Canton, Ohio	35	28	5	-	2	-	6
Chicago, Ill.§	564	362	125	45	10	22	16
Cincinnati, Ohio	187	130	32	14	5	6	23
Cleveland, Ohio	159	105	39	6	3	6	5
Columbus, Ohio	168	110	30	17	5	6	13
Dayton, Ohio	105	72	20	8	2	3	9
Detroit, Mich.	260	156	49	28	15	12	6
Evansville, Ind.	35	25	9	1	-	-	2
Fort Wayne, Ind.	64	45	9	6	3	1	2
Gary, Ind.	21	12	6	3	-	-	1
Grand Rapids, Mich.	64	45	10	5	2	2	5
Indianapolis, Ind.	166	90	47	14	5	10	6
Madison, Wis.	27	17	6	2	1	1	-
Milwaukee, Wis.	133	100	24	4	2	3	6
Peoria, Ill.	47	28	8	2	1	8	3
Rockford, Ill.	42	32	6	2	1	1	7
South Bend, Ind.	45	29	12	1	1	2	1
Toledo, Ohio	125	90	24	8	2	1	9
Youngstown, Ohio	70	54	11	4	-	1	10
W.N. CENTRAL	729	527	128	39	14	20	32
Des Moines, Iowa	59	43	11	2	2	1	4
Duluth, Minn.	36	30	4	2	-	-	1
Kansas City, Kans.	35	25	5	3	-	2	-
Kansas City, Mo.	98	73	19	5	-	1	4
Lincoln, Nebr.	37	28	6	2	-	1	5
Minneapolis, Minn.	184	132	32	10	7	3	15
Omaha, Nebr.	71	50	14	2	3	2	2
St. Louis, Mo.	118	84	22	9	-	3	-
St. Paul, Minn.	53	37	11	2	-	3	1
Wichita, Kans.	38	25	4	2	2	4	-
S. ATLANTIC	1,332	779	288	182	43	39	69
Atlanta, Ga.	168	94	36	33	4	1	4
Baltimore, Md.	173	104	37	22	5	5	12
Charlotte, N.C.	82	51	12	12	2	5	9
Jacksonville, Fla.	112	65	20	14	8	5	8
Miami, Fla.	109	64	25	17	1	2	-
Norfolk, Va.	63	35	20	5	1	2	3
Richmond, Va.	81	52	17	5	4	3	5
Savannah, Ga.	58	42	11	2	1	2	3
St. Petersburg, Fla.	58	47	4	4	-	3	6
Tampa, Fla.	67	30	20	12	2	2	2
Washington, D.C.	338	176	82	56	15	9	12
Wilmington, Del.	23	19	4	-	-	-	5
E.S. CENTRAL	844	571	167	71	22	12	61
Birmingham, Ala.	139	93	24	10	7	5	4
Chattanooga, Tenn.	76	56	15	3	2	-	10
Knoxville, Tenn.	102	68	15	14	3	2	13
Louisville, Ky.	105	76	23	3	-	3	7
Memphis, Tenn.	186	123	36	18	8	-	14
Mobile, Ala.	66	46	14	4	2	-	1
Montgomery, Ala.	41	28	10	3	-	-	4
Nashville, Tenn.	129	81	30	16	-	2	8
W.S. CENTRAL	1,766	1,077	400	191	55	43	77
Austin, Tex.	53	36	10	2	3	2	4
Baton Rouge, La.	77	52	16	8	1	-	3
Corpus Christi, Tex.§	46	33	9	4	-	-	2
Dallas, Tex.	210	117	56	27	7	3	6
El Paso, Tex.	90	49	19	13	4	5	6
Fort Worth, Tex	98	60	19	9	5	5	6
Houston, Tex.§	734	436	169	89	24	16	18
Little Rock, Ark.	52	26	17	7	1	1	10
New Orleans, La.§	106	63	25	12	3	3	-
San Antonio, Tex.	137	90	33	8	4	2	13
Shreveport, La.	78	52	12	8	3	3	4
Tulsa, Okla.	85	63	15	4	-	3	5
MOUNTAIN	698	465	138	57	20	18	48
Albuquerque, N. Mex.	72	49	18	4	-	1	3
Colo. Springs, Colo.	43	34	5	2	2	-	6
Denver, Colo.	99	66	18	8	3	4	4
Las Vegas, Nev.	122	77	27	14	3	1	10
Ogden, Utah	28	23	3	2	-	-	6
Phoenix, Ariz.	131	81	25	14	6	5	12
Pueblo, Colo.	29	24	3	2	-	-	-
Salt Lake City, Utah	41	24	9	4	2	2	-
Tucson, Ariz.	133	87	30	7	4	5	7
PACIFIC -	2,202	1,408	408	239	80	56	135
Berkeley, Calif.	16	13	1	2	-	-	3
Fresno, Calif.	55	32	7	7	8	1	7
Glendale, Calif.	53	38	12	2	1	-	6
Honolulu, Hawaii	75	46	16	5	2	6	13
Long Beach, Calif.	84	56	13	7	4	4	9
Los Angeles Calif.	765	492	136	87	32	8	37
Oakland, Calif.	84	54	18	8	1	2	5
Pasadena, Calif.	34	21	8	1	2	2	2
Portland, Oreg.	155	102	34	12	5	2	8
Sacramento, Calif.	141	78	31	17	6	9	11
San Diego, Calif.	153	101	19	19	6	8	12
San Francisco, Calif.	181	102	39	34	3	3	3
San Jose, Calif.	166	114	31	10	5	6	6
Seattle, Wash.	154	98	27	21	4	4	6
Spokane, Wash.	49	31	13	4	-	1	3
Tacoma, Wash.	37	30	3	3	1	-	4
TOTAL	13,263††	8,605	2,684	1,222	365	373	775

*Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

**Pneumonia and influenza.

†Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

††Total includes unknown ages.

§Data not available. Figures are estimates based on average of past available 4 weeks.

Neisseria gonorrhoeae — *Continued*

resistance caused by chromosomal mutations, CDC recommended that tetracycline not be used as sole therapy for gonorrhea (*6*); the subsequent emergence of TRNG has further emphasized the importance of this recommendation.

TRNG is important for two reasons: first, because it has high-level resistance to tetracycline, and second, because experimentally its 25.2-megadalton (Mdal) TetM-containing plasmids may transfer both itself and β-lactamase plasmids to *Neisseria* and related species (*7*). This conjugative ability of the 25.2-Mdal plasmid may have resulted in the emergence of PPNG/TRNG (*7*). PPNG/TRNG accounted for a small proportion of all isolates examined in 1988 and 1989. However, because these isolates accounted for 9.7% of all *N. gonorrhoeae* isolates from the Philadelphia clinic in 1989, and because the frequency of PPNG/TRNG isolates identified from other clinics increased almost threefold between 1988 and 1989, infections caused by these strains will further challenge the selection of gonorrhea therapies.

Despite the increase in the frequency of strains with plasmid-mediated resistance to penicillins and tetracycline, all isolates examined were susceptible to ceftriaxone (MIC $\leq$0.25 μg/mL), and fewer than 1% were resistant to spectinomycin (MIC $\geq$128 μg/mL) (CDC, unpublished data). Initial therapy for gonococcal infection with ceftriaxone (250 mg intramuscularly), or an antimicrobial agent with proven equivalency, remains an integral component of the strategy for gonorrhea control (*8*).

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Update: Influenza Activity — Worldwide and Recommendations for Influenza Vaccine Composition for the 1990–91 Influenza Season

Worldwide

During the 1989–90 influenza season, influenza type A(H3N2) viruses have caused most influenza activity worldwide. Influenza B has been isolated in 19 countries; isolates of influenza A(H1N1) have been uncommon.

In the 1989–90 season, influenza A(H3N2) activity began earlier than usual in the northern hemisphere. In Asia, Europe, and North America, outbreaks occurred as early as October and November. From October 1989 through March 1990, epidemics or local outbreaks of influenza A(H3N2) were reported in 21 countries: Belgium,

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Bulgaria, Canada, China, Czechoslovakia, Federal Republic of Germany, Finland, France, Greece, Iran, Israel, Italy, Japan, Netherlands, Republic of Korea, Spain, Sweden, Switzerland, United Kingdom, United States, and Union of Soviet Socialist Republics (USSR). Six countries reported sporadic* isolates of influenza A(H3N2): Austria, Denmark, Egypt, German Democratic Republic, Norway, and Yugoslavia.

Influenza B has been isolated from outbreaks in Finland, France, Italy, and Japan. Sporadic cases occurred in 15 countries: Australia, Canada, China, Denmark, Federal Republic of Germany, Hong Kong, Hungary, Israel, Norway, Sweden, Switzerland, United Kingdom, United States, USSR, and Yugoslavia.

Influenza A(H1N1) has been isolated from sporadic cases in Canada, France, the United States, and Yugoslavia. Both influenza A(H3N2) and A(H1N1) viruses were isolated from an outbreak reported in the United States.

Antigenic Analysis of Recent Influenza Isolates and Recommendations for Influenza Vaccine Composition for the 1990–91 Season

Three antigenically distinct groups of influenza A(H3N2) viruses were isolated worldwide this season; most were A/Shanghai/11/87- and A/England/427/88-like (Table 1). Influenza A(H1N1) isolates and influenza B isolates studied were similar to those used in the vaccine for the 1989–90 season. After considering data on these and other virus isolates, the World Health Organization (WHO) recommended that the trivalent influenza vaccine for the 1990–91 season contain type A(H3N2) A/Guizhou/54/89-like antigen and retain the type A(H1N1) (A/Singapore/6/86-like) and type B (B/Yamagata/16/88-like) components of the 1989–90 vaccine (*1*).

Antigenic analysis of influenza A(H3N2) viruses isolated worldwide indicates that most of these viruses were A/Shanghai/11/87- and A/England/427/88-like. The most prevalent group of viruses resembles the majority of viruses isolated during the 1988–89 influenza season and are similar to the H3N2 component of this year's vaccine (*1,2*).

The second group of influenza A(H3N2) viruses that were antigenically distinguishable from the A/Shanghai/11/87-like viruses are represented by A/Guizhou/54/89 and A/Shanghai/16/89. Viruses in this group react poorly with antiserum to the 1989–90 vaccine strain (A/Shanghai/11/87); however, antiserum prepared to these viruses reacted well with A/Shanghai/11/87-like viruses from the 1989–90 season. Viruses antigenically similar to the A/Guizhou/54/89 and A/Shanghai/16/89 viruses were isolated in China, Europe, and the Americas. Persons vaccinated with A/Shanghai/11/87 vaccine had lower antibody responses to the A/Guizhou/54/89-like strains than

*Sporadic activity is defined as sporadically occurring influenza-like illness or culture-confirmed influenza, with no outbreaks detected.

TABLE 1. Antigenic characterization of type A(H3N2) influenza viruses, by hemagglutination inhibition

	Ferret antisera				
Reference antigen	**1**	**2**	**3**	**4**	**5**
1. A/Shanghai/11/87	**640**	80	640	160	80
2. A/England/427/88	160	**160**	1280	160	80
3. A/Guizhou/54/89	40	20	**640**	160	20
4. A/Shanghai/16/89	80	40	320	**160**	20
5. A/Beijing/353/89	80	80	80	40	**1280**

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to the vaccine strain. The postvaccine geometric mean titer for the A/Guizhou/54/89-like viruses was only 50% of that for the A/Shanghai/11/87 virus (Table 2).

The third group of influenza A(H3N2) viruses is represented by the A/Beijing/353/89 virus (Table 1). This virus also reacted poorly with antiserum to the 1989–90 vaccine strain, but, in contrast to viruses in the first group, did not produce ferret antiserum that reacted well with the majority of viruses from the current season. A/Beijing/353/89-like viruses have been isolated only from northern China and the United States; antibody response to this strain in persons receiving the A/Shanghai/11/87 vaccine was not reduced compared to the vaccine strain (*1*).

Antigenic analysis of the limited number of type A(H1N1) virus isolates indicates that, although some heterogeneity was detected among recent isolates, all reacted well with ferret antiserum prepared to the A/Taiwan/1/86 (A/Singapore/6/86-like) vaccine strain. The antibody induced in human volunteers by this vaccine component reacted well with recent representative A(H1N1) isolates.

Both influenza B/Victoria/2/87- and B/Yamagata/16/88-like viruses have been isolated this season in Asia, North America, and Europe. Some antigenic heterogeneity among the B/Yamagata/16/88-like viruses, such as that represented by B/Hong Kong/22/89, was detected (Table 3). Antibody induced by the B/Yamagata/16/88 virus in adult volunteers was broadly reactive against recent influenza B isolates, including the B/Hong Kong/22/89-like viruses (*1*).

The WHO recommendation for the 1990–91 influenza vaccine has been ratified by the Food and Drug Administration's Vaccine Advisory Panel. The specific antigens that will be in the 1990–91 vaccine for the United States are A/Shanghai/16/89(H3N2), A/Taiwan/1/86(H1N1), and B/Yamagata/16/89.

Reported by: P Palmer, K Edwards, MD, Vanderbilt Univ, Nashville, Tennessee. F Ruben, MD, Univ of Pittsburgh, Pittsburgh, Pennsylvania. P Graves, G Meiklejohn, MD, Univ of Colorado, Denver, Colorado. G Schild, PhD, National Institute of Biological Standards and Control, London,

TABLE 2. Hemagglutination-inhibition antibody responses to the A/Shanghai/11/87 (H3N2) component of the 1989–90 trivalent influenza vaccine*

Age group (yrs)†	No. persons	Virus strain	Pre-vaccination GMT§	Post-vaccination GMT§
<16	30	A/Shanghai/11/87	92	130
		A/England/427/88	94	133
		A/Guizhou/54/89	47	59
25–40	25	A/Shanghai/11/87	46	78
		A/England/427/88	46	68
		A/Guizhou/54/89	41	49
69–100	33	A/Shanghai/11/87	36	48
		A/England/427/88	25	36
		A/Guizhou/54/89	17	24

Sources: Vanderbilt University, Nashville, Tennessee; University of Colorado, Denver, Colorado; University of Pittsburgh, Pittsburgh, Pennsylvania.

*Volunteers received trivalent influenza vaccine containing 15 μg each of A/Shanghai/11/87 (H3N2), A/Taiwan/1/86(H1N1), and B/Yamagata/16/88.

†Actual ages of persons from whom serum specimens were obtained.

§Geometric mean titer.

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United Kingdom. National Influenza Centers, Microbiology and Immunology Support Svcs, World Health Organization, Geneva, Switzerland. Div of Virology, Center for Biologics Evaluation and Research, Food and Drug Administration. Participating state and territorial health department epidemiologists and state public health laboratory directors. WHO Collaborating Center for Influenza, Influenza Br and Epidemiology Office, Div of Viral and Rickettsial Diseases, Center for Infectious Diseases, CDC.

Editorial Note: Because 6 months are required for production, quality control, and distribution of the approximately 30 million doses of influenza vaccine produced annually in the United States, vaccine strains must be selected by late March to early April each year. In 1990, three antigenically indistinguishable viruses (A/Guizhou/54/89, A/Shanghai/16/89, and A/Guandong/39/89)—all isolated in the People's Republic of China from June to September 1989—were candidates for the influenza A(H3N2) vaccine component. Because the growth properties of the A/Shanghai/16/89 virus were most favorable for vaccine production, this strain will be included in the 1990–91 influenza vaccine. This strain is antigenically distinct and should not be confused with the A/Shanghai/11/87(H3N2) virus included in last year's vaccine (Table 1). Specific recommendations by the Immunization Practices Advisory Committee for the prevention and control of influenza are forthcoming (*3*).

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TABLE 3. Antigenic characterization of type B influenza viruses, by hemagglutination inhibition

	Ferret antisera		
Reference antigen	**1**	**2**	**3**
1. B/Victoria/2/87	**80**	<10	<10
2. B/Yamagata/16/88	10	**1280**	160
3. B/Hong Kong/22/89	20	160	**160**

Epidemiologic Notes and Reports

Update: Evidence of Filovirus Infection in an Animal Caretaker in a Research/Service Facility

Evidence of filovirus infection in workers in quarantine facilities for imported primates has prompted new guidelines for safe handling of monkeys and the requirement for a special permit to import cynomolgus, African green, and rhesus monkeys into the United States (*1,2*). This evidence of infection has also prompted studies of other workers exposed to monkeys in various types of facilities.

Filovirus serologic testing was done on 55 CDC employees with current or previous occupational exposure to monkeys. One of these employees, an animal caretaker who had previously handled cynomolgus monkeys but has had no contact with any

Filovirus — Continued

monkeys since December 1988, was seropositive (filovirus antibody titer ≥16 by indirect immunofluorescent antibody and confirmed by Western blot). Serosurveys of other groups of persons exposed to monkeys are in progress.

Reported by: RK Sikes, DVM, State Epidemiologist, Georgia Dept of Human Resources. Div of Viral and Rickettsial Diseases, Scientific Resources Program, Center for Infectious Diseases, CDC.

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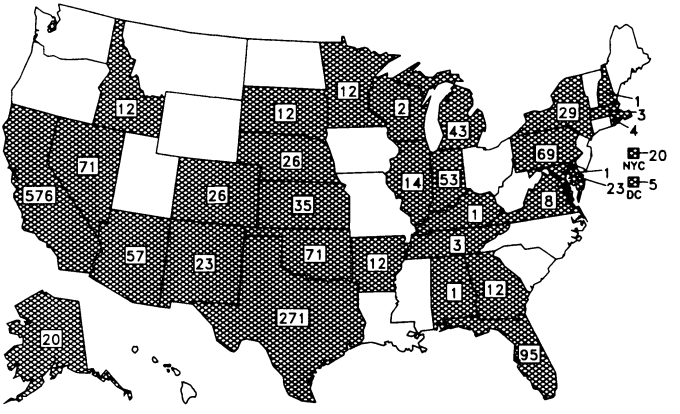
1. CDC. Update: Ebola-related filovirus infection in nonhuman primates and interim guidelines for handling nonhuman primates during transit and quarantine. MMWR 1990;39:22–4,29–30.
2. CDC. Requirement for a special permit to import cynomolgus, African green, or rhesus monkeys into the United States. Federal Register 1990;55:15210–1.

Notice to Readers

Hepatitis Hotline

CDC's Hepatitis Branch, Division of Viral and Rickettsial Diseases, Center for Infectious Diseases, now has an automated telephone system that provides information on viral hepatitis, including modes of transmission, prevention, serologic diagnosis, infection control, and statistics. Persons requesting information on viral hepatitis should call the CDC Disease Information Hotline at (404) 332-4555.

Reported cases of measles, by state — United States, weeks 14–17, 1990



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The data in this report are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday. The editor welcomes accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Such reports and any other matters pertaining to editorial or other textual considerations should be addressed to: Editor, *Morbidity and Mortality Weekly Report*, Centers for Disease Control, Atlanta, Georgia 30333; telephone (404) 332-4555.

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