

## Investigation of Six (06) Cases of AFP Notified from Week 01 to 17 in the Health District of Kolondièba in Mali in 2023

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### Abstract

*Poliomyelitis is an infectious disease caused by the poliovirus and largely affects children under the age of 05. Our descriptive study concerned the analysis of suspected cases of poliomyelitis notified from week 01 to 17 in the health district of Kolondièba in 2023. During this period six (06) cases of AFP were notified by Community Health Centers (CHC) from Diaka (02 cases), Kolosso (01 case), Central (02 cases) and Fakola (01 case) case imported from the Ivory Coast in search of care. Their age range was 0-4 years and presented paralysis of the lower limbs for some and upper for others. Vaccination coverage with oral polio vaccine in the first quarter in Diaka and Kolosso was > 95%, on the other hand, Central and Kolosso had a rate <95%. The female gender accounted for 66.67% of cases with a sex ratio of 0.6. The attack rate was 8.91 cases per 100,000 inhabitants. Only three of the six (06) cases received at least three doses of vaccine. The risk factors were the uncontrolled migratory flow and the inaccessibility of health centers. The assessment of the living environment did not show any environmental risk factors. The survey made it possible to build the capacity of service providers on the surveillance of notifiable diseases, raise public awareness of risk factors, the declaration of children under 15 with paralysis regardless of the cause at the health center. and compliance with the vaccination schedule.*

**Keywords :** AFP, Mali, Poliomyelitis, investigation, vaccination.

### Introduction

Vaccine-preventable poliomyelitis or polio is a highly infectious viral disease that largely affects children under 5 years of age [1, 2]. The virus is transmitted from person to person mainly by fecal-oral transmission. Less frequently, it can be carried by an ordinary medium (for example, contaminated water or food) [1]. It multiplies in the intestine, from where it can invade the nervous system and cause paralysis. Most infected people show no

symptoms, however less than 1% of infections result in irreversible paralysis [3].

In 1988, the World Health Assembly adopted a resolution calling for the global eradication of poliomyelitis, marking the creation of the Global Poliomyelitis Eradication Initiative (GPEI) led by national governments, WHO, Rotary International, the United States Centers for Disease Control and Prevention and UNICEF, later joined by the Bill and Melinda Gates Foundation and Gavi, the Vaccine Alliance [4].

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Cases due to wild poliovirus have decreased by more than 99% since 1988, from an estimated 350,000 cases in more than 125 endemic countries to 175 reported cases in 2019. Among the 3 strains of wild poliovirus (type 1, type 2, and type 3), wild poliovirus type 2 was eradicated in 1999 and no cases due to poliovirus type 3 have been observed since the last case reported in Nigeria in November 2012. These two strains have been officially recognized as being eradicated worldwide. In 2020, wild poliovirus type 1 is still circulating in two countries: Pakistan and Afghanistan [5].

In 2020-2021, cases due to circulating vaccine-derived polioviruses were reported in 31 countries, 1, 2, and Malawi reported one case of wild poliovirus type 1, with onset of paralysis in 2021, just over 1 year after the WHO African Region was certified Wild Polio Virus (WPV) [6].

In 2020, the COVID-19 pandemic disrupted polio immunization and disease surveillance activities in WHO regions; between January and September 2020, the number of reported AFP cases decreased and the time between the collection of stool samples and their receipt at the laboratory increased compared to the same period in 2019 [7].

Drawn from surveillance performance indicators for 2020 and 2021 of the 43 priority countries and thus updates previous reports. In 2021, a total of 32 (74%) priority countries achieved two key national surveillance performance indicator targets, which is an improvement from 2020 when only 23 (53%) achieved the targets. two objectives [8].

Since 2017, several genetically distinct Circulating Vaccine-Derived Poliovirus type 2 (cVDPV2) outbreaks continue to be reported in the Region. A total of 21 countries are affected by the ongoing cVDPV2, and outbreak response activities continue to be implemented in Angola, Benin, Burkina Faso, Cameroon, Central African Republic, Côte d'Ivoire, in the Democratic Republic of Congo, Ethiopia, Ghana, Guinea, Kenya, Liberia, Mali, Niger,

Nigeria, Republic of Congo, Senegal, Sierra Leone, South Sudan and Chad, as well as in Togo [1].

In 2020, Mali did not detect any cases of poliovirus after the responses organized to counter the epidemics of Circulating vaccine-derived poliovirus type 2. However, in 2022, the country recorded 02 cases of polio from vaccine sources in the regions of Ménaka and Taoudénit [9].

However, significant national and sub-national gaps persist. Effective poliovirus surveillance is essential to track poliovirus transmission. Frequent monitoring of surveillance indicators could help identify gaps, guide improvements, and enhance the overall sensitivity and timeliness of poliovirus detection to achieve polio eradication [8].

Surveillance by a network of laboratories capable of determining the viral origin of cases of acute flaccid paralysis (AFP) is one of the four strategies recommended by WHO for the eradication of poliomyelitis [10, 11], the documentation of all cases of acute flaccid paralysis (AFP) are very important for the eradication of poliomyelitis [12].

Thus, thanks to the weekly update of the rapid documentary review of the poliomyelitis surveillance system in Mali showed a high rate of case notification by the regions (6/10 or 60%) in addition to the district of Bamako [13].

In 2023, in the Kolondièba district during the first 17 epidemiological weeks, 06 suspected cases of acute flaccid paralysis were recorded in the health structures as follows: Diaka (2 cases: week 6) Kolondièba Central (2 cases: week 17), Kolosso (1 case: week 11) and Fakola (1 case: week 8), all were sampled and the samples sent to the national reference laboratory of the National Institute of Public Health for confirmation.

Our descriptive cross-sectional study consists of an analysis in time, place, and person and of risk factors, vaccination status, notions of travel of suspected cases of

poliomyelitis notified from week 01 to 17 in the Kolondièba health district in 2023.

The objective of this study is to elucidate this situation and to contribute to the strengthening of the epidemiological surveillance of Acute Flaccid Paralysis in the said district.

## Methodology

### Study Area

The investigation took place from April 26 to May 3, 2023, in the Kolondièba central,

Kolosso and Fakola health areas in the Kolondièba health district in Mali.

The Kolondièba district has 24 health areas and 86 Community Health Agents (CHW) sites with a total population of 312,964 inhabitants, of which 67,287 are in the 0-4 age group, it is limited to the north by the district of Bougouni, in the south the republic of the ivory coast and the Kadiolo health district, in the west by that of Sikasso.

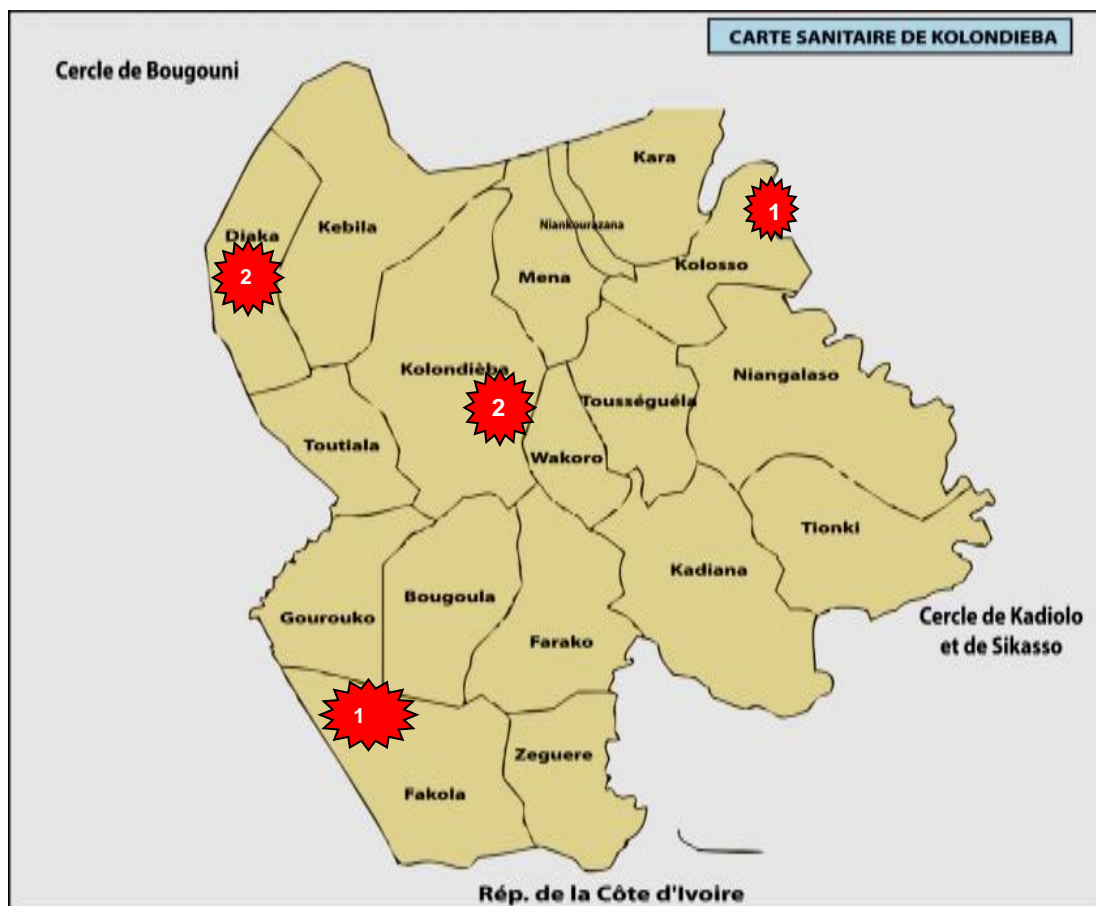


Figure 1. Health Map of Kolondièba

## Investigation Implementation Process

### Acute Flaccid Paralysis Standard Case Definition (AFP)

Any child under the age of 15 with Acute Flaccid Paralysis (AFP) or any person suffering from paralysis, regardless of age, in whom the doctor suspects poliomyelitis [14].

### Acute Flaccid Paralysis Operational Case Definition (AFP)

Any child under 15 who was crawling or walking and suddenly no longer crawling or walking Or Weakness of one or more limbs occurring in the last 6 months whatever the cause and having stayed in the village for the last 30 days before the onset of paralysis or weakness [15].

## **Inadequate Acute Flaccid Paralysis (AFP)**

Any case of Acute Flaccid Paralysis (AFP) in whom:

1. One or both stool specimens were collected beyond 14 days.
2. Samples collected less than 24 hours or more than 48 hours.
3. A single stool sample taken.
4. Notification without sample collection.
5. Insufficient stool collection (less than 8 to 10 grams).
6. The sample arrived at the laboratory in poor condition.
7. Poor quality of the investigation sheet.

## **Contact Subject**

Any child under the age of 5 who lives in the same household or, failing that, the household closest to the home with an inadequate case of Acute Flaccid Paralysis. Three (03) contact cases to be sampled around each inadequate case with 1 stool per contact case.

## **Compatible Case**

Any case of Acute Flaccid Paralysis with inadequate stool specimen and negative lab result with:

1. Residual paralysis was found on follow-up examination with no other obvious cause.
2. Any case that has not benefited from a follow-up examination (more than 90 days, lost to sight or died).

## **Hot Case of Acute Flaccid Paralysis (AFP)**

Case of Acute Flaccid Paralysis (AFP) likely to be a case of paralysis due to Wild Polio Virus either on the basis of a clinical examination (age: Child under 5 years old, fever at onset, sudden paralysis, of rapid and asymmetric progression, zero dose or insufficiently vaccinated (less than 03 doses) and/or a case of Acute Flaccid Paralysis (AFP) having had direct contact with a confirmed case

of Wild Polio Virus, this pending the reference laboratory results [16].

## **Silent Health District**

Any Health District which has not notified any case of Acute Flaccid Paralysis since the beginning of the year until the monitoring period.

## **Data Collection Techniques and Tools**

The collection technique of the survey consisted of direct interviews by administering a questionnaire to the parents of patients and health professionals in these localities, documentary review and observation. The documentary exploitation was made using the following tools (the consultation registers, the linear lists of cases, the weekly reports of the cases, the notebooks of disease with obligatory declaration and the sheets of investigation of the cases), sheet of analysis of the cases and the interview questionnaire.

## **Data Analysis**

Data processing and analysis were done with Excel and Word software. This analysis focused on the variables: age, sex, place of residence, vaccination status, medical history, concept of travel and stay and on the risks of exposure as well as the assessment of the living environment. In addition, control actions have been carried out.

## **Results**

### **Description of Case Trends Over Time**

#### **Origin of Cases**

These are 06 children in the age group of 0-4 years of both sexes (male, female), from:

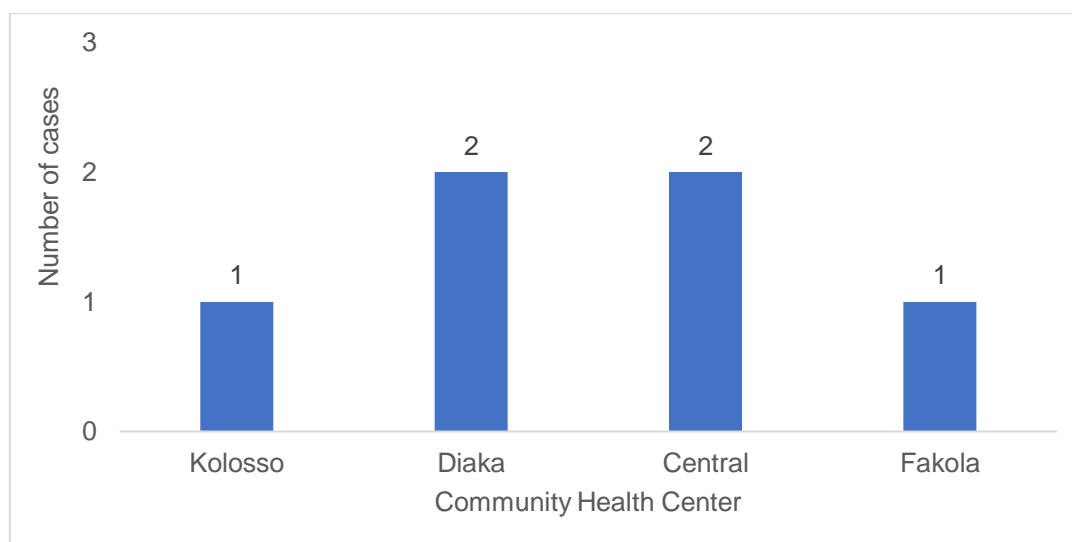
1. CHC Diaka: 1 case from the village of Diaka and the other from Degoro-foungalo
2. CHC Central: 2 cases both come from the city of Kolondièba.
3. CHC Kolosso: the only case comes from the village of Kolosso.
4. CHC Fakola: the case comes from Ouéli in Côte d'Ivoire.

The onset of the disease of the first cases dates to 02/15/2023 in the health area of Fakola. Other cases were declared successively in Kolondièba center on March 14, 2023, and in Kolosso on March 19, 2023. Adequate stool samples from the 06 suspected cases were taken

within 24-72 hours of notification and sent to the laboratory for confirmation.

The survey of the living environment (use of latrines), which despite everything is a rural area, did not detect any anomaly or risk factors for the other children, however regular hand washing is not effective.

### Evolution of Cases and Deaths

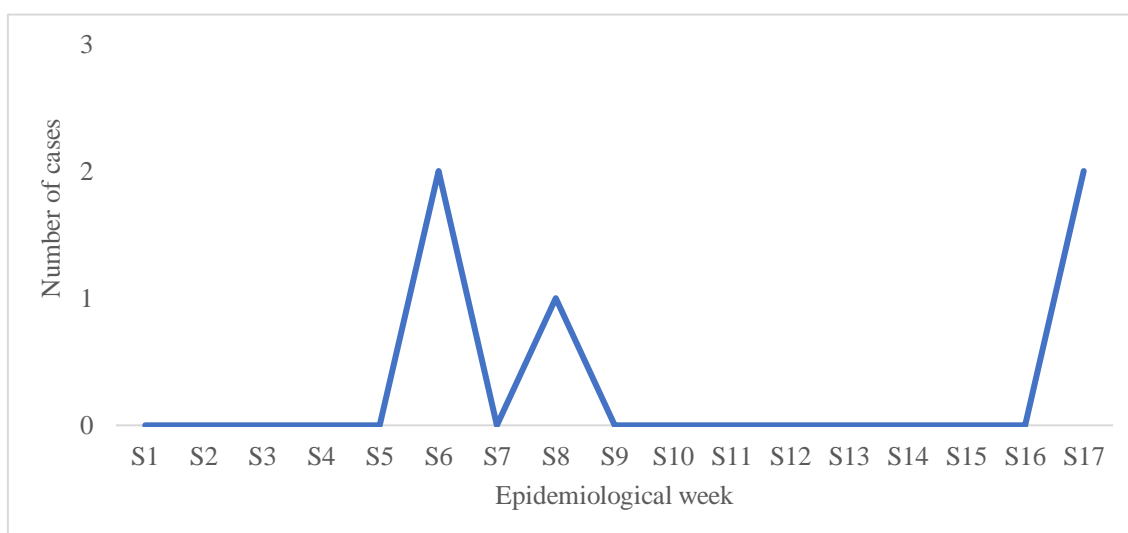


**Figure 2.** Distribution of AFP Cases by CHC from Week 1 to 17 in the District of Kolondièba in Mali in 2023

Cases of Acute Flaccid Paralysis (AFP) were recorded in 4 health facilities out of 24 in the district. Also, all the cases were investigated, notified, sampled, and forwarded within 24 hours to the higher level. This demonstrates compliance with the performance standards as

defined (notification time <7 days, investigation <24-48 hours and delivery of samples <72 hours).

During the period, two peaks were recorded, one in week 06 and the other in week 17.



**Figure 3.** Evolutionary Curves of Suspected Cases of Acute Flaccid Paralysis (AFP) in Kolondièba from Week 1 to 17 of 2023

## Individual Case Characteristics

The female sex recorded the most cases with a sex ratio of 0.6.

It should be noted that all the ages represented are those of the age group of the Expanded Routine Immunization Program 0-4 years.

**Table 1.** Description of Cases by Sex from Week 1 to 17 in the Kolondièba Health District in Mali in 2023

<i>Sex</i>	<i>Number of cases (N=6)</i>	<i>Percentage (%)</i>
Male	2	33.33
Feminine	4	66.67

**Table 2.** Description of Cases by Age from Week 1 to 17 in the Kolondièba District, Mali in 2023

<b>Age range</b>	<b>Population 0-4 years (67287 hbts)</b>	<b>Number of cases (N=6)</b>	<b>Attack rate for 0-4 age group (100,000 hbts)</b>
≤1 mois	67,287	2	8.91
2 ans		1	
3 ans		3	

Source population 0-4 years Mali DHIS2 (67,287 inhabitants)

## Migration and Routing of Cases

Among the 06 cases, only one case left the neighboring country of Côte d'Ivoire (Ouéli) for

Fakola in search of care, all the others have no concept of travel.

**Table 3.** Description of Cases According to Vaccination Status of Cases from Week 1 to 17 in the District of Kolondièba in Mali in 2023

<i>Notifying health center</i>	<i>Socio-demographic variables</i>		<i>Vaccination status</i>			
	Age	Sex	1 scoop	2 doses	3 doses	4 doses
Diaka	2 years	M	X	X	X	X
	3 years	F	X	X	X	X
Central	3 years	M	X	X	None	None
	3 years	F	X	X	X	None
Kolosso	1 day	F	X	None	None	None
Fakola	1 month	F	None	None	None	None

It is noted that out of all the six (06 cases) only 3 among them received at least three doses of vaccine against poliomyelitis.

The Oral Polio Vaccine third dose (OPV3) vaccination coverage rate of these Community Health Centers (CHC) during the first quarter is as follows: Diaka 102.8% > 95%; Fakola 452.9% > 95% this rate of vaccination coverage more than 100% may be due to migratory flows and to the underestimation of the target population and children outside vaccinated areas. However, Central (75% < 95%) and

Kolosso (82.7 < 95%) did not reach the vaccination coverage performance rate of > 95%.

## Identification of Risk Factors

The risk factors are the porosity of the borders with neighboring countries which makes health checks difficult, but also the uncontrolled migratory flow and the inaccessibility of the healthcare centre. Furthermore, the survey of the living

environment did not reveal any environmental risk factor for the other children.

### **Assessment of Case Management**

1. The central cases were recognized as malnourished and were therefore taken care of by the Recovery and Intensive Nutritional Education Unit of the Reference Health Center of Kolondièba, this care contributed to the improvement of the paralytic state of the cases.
2. For the cases of Fakola and Diaka, they were administered an analgesic (paracetamol), the care allowed a physical improvement of the cases.
3. That of Kolosso, meanwhile, was taken care of for a brachial plexus. The child before his release had a more stable evolution than when he was admitted.

### **Control Actions**

This investigation trip made it possible to raise public awareness of the merits of vaccination, the declaration to the nearest health center of any case of paralysis whatever the cause, compliance with the vaccination schedule and the use of health center for any limb weakness in a child under 15 years of age. In addition, sensitizations have been made to the population on the risks of lifelong disability because of poliomyelitis in unvaccinated children.

### **Discussions**

The results of the investigation show that the reported cases meet the case definition of acute flaccid paralysis as recommended by the WHO. All six (06) are from the 0-4 age bracket almost like the results of the Ivory Coast [7], Nigeria [17], India [18], Hamadan in Iran [19], Italy [20] and Lebanon [21] who found that children under 5 accounted for the most cases. The sex ratio was 0.6 lower than those of the Ivory Coast 1.3 [7].

As for the level of protection, only 60% of children had received at least a dose, results higher than the 53.8% stated in Côte d'Ivoire in 2015 [7], yet lower than the 70.07% reported in Guinea [6] and Nigeria (98.3 %) [22], hence the need to strengthen the expanded immunization program in health facilities in the district.

In addition, 100% of cases had two stool samples taken and sent to the laboratory within 14 days, results higher than 96.14% of cases reported in Guinea [6] and Spain (72.5%) [23], and different from those found in South Africa (53.0%) [24]. As in our study, cases of non-polio flaccid paralysis are more numerous because the definition has become more sensitive [8].

The results of this report are subject to at least three limitations. First, security issues and hard-to-reach populations may affect Acute Flaccid Paralysis (AFP) surveillance and limit the interpretation of surveillance indicators. Second, high rates of Acute Flaccid Paralysis without poliomyelitis do not necessarily imply very sensitive surveillance, as not all reported cases of Acute Flaccid Paralysis may not meet the case definition, some actual cases of Acute Flaccid Paralysis may not be detected, and background Non-Polio Flaccid Paralysis rates may vary. Finally, the quality of the adequacy of the stool sample depends on the ability of the field interviewer to accurately obtain the date of paralysis onset. Quality surveillance is essential to achieve the goal of global polio eradication and rapid and effective detection, reporting, and investigation of cases of Acute Flaccid Paralysis. This also includes specimen transport and laboratory testing. Frequent monitoring of surveillance indicators can help identify gaps, guide decisions, and improve the quality of surveillance.

While waiting for the confirmation results of these cases from the sensitization sessions on the Expanded Vaccination Program, the risk factors and sequelae of the disease must also be reinforced for the populations.

## Recommendations

**Table 4.** Recommendations

<b>Recommendations</b>	<b>Responsible</b>
Train community traditional healers in the district on Acute Flaccid Paralysis (AFP)	Chief doctor
Strengthen community surveillance of Notifiable Diseases.	Center Technical Director / Community Health Worker (CHW)
Strengthen the active search for cases of Acute Flaccid Paralysis.	Center Technical Director / Community Health Worker (CHW)
Sensitize communities on the importance of vaccination and compliance with the vaccination schedule	Community Health Worker (CHW)
Strengthen routine immunization.	Vaccinator Agent
Find those lost to follow-up by involving community leaders	Center Technical Director / Vaccinator Agent / Community Health Worker (CHW)
Establish a framework for regular consultation between the district of Kolondièba and those of the neighboring country with which it shares borders	Chief doctor
Advocate for improved security to strengthen access to care	Actors in charge of security
Strengthen the active and passive search for cases of Acute Flaccid Paralysis (AFP) by involving relays, community leaders and traditional healers	Center Technical Director

### Conflict of Interest

All authors and co-authors declare that they have no conflict of interest in the work presented.

### Conclusion

The investigation allowed us to note that the cases notified by the health facilities of the Kolondièba district respond to suspected cases of Acute Flaccid Paralysis (AFP) as defined in the context of epidemiological surveillance. Risk factors related to the vaccination coverage of children have been identified. To deal with

this situation, recommendations have been formulated both for health workers and for the community.

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